$1.00 a Year Published Monthly 50c a Copy

VETERINARY MEDICINE

NOVEMBER 1944

OCT 24 1944
FORESTRY

CONTENTS

Veterinary Progress, Policies and Comment 399-408

The Wool Clip for 1944, 399; Organisms Most Sensitive to Penicillin, 399; Cause of Blackleg in Cattle, 399; Aseptic Surgery, 399; Surgical Dressing Sponges of Starch, 399; Record August Slaughter of Beef, 399; Difference between Corn Oil and Butterfat, 399; Ancient Use of Urea for Pyorrhea, 399; Freon Gas "Bomb" Effective against Bacteria, 399; College of Veterinary Medicine, Washington State College, 400; Pig Loss During First Six Days Due to Uremia, 401; Vitamins in a Cup of Tea, 401; Borden Award to Fred Beaudette, 401; Skin Test for Trichinella Infection, 401; Effect of DDT on Animals, 401; Runts among Different Species, 401; Increase of Frozen Food Industry, 401; Implantation of Diethylstilbestrol in Young Turkeys, 401; Foot-and-Mouth Disease in Peru, 401; Newly Developed Sulfa Drug, 401; Hooves and Horn for Meat Protein Substitute, 401; Veterinary Corps Safeguards Army Food Supplies, 402-405; Regulations for the Movement of Livestock, 406; Extension of Meat Inspection, 407; Absorption and Storage of Vitamins, 407.

Susceptibility of Animals Other than Solipeds to Infectious Anemia 408

Preliminary Report of Lentin in Atonic Indigestion of Cattle 414

Phemerol in Treatment of Cows with Chronic Streptococcic Mastitis 417

Influence of B Vitamins, Liver and Yeast on Induced Necrotic Enteritis in Swine 421

Autobiography of a Veterinary Practitioner (Conclusion) 424

Clinical Reports 428-431

Pseudarthrosis in a Dog, 428; Death in a Colt from a Fall, 428; Bilateral Episiotomy in a Cow, 429; Cow Impaled on an Angle Iron Fence Post, 429; Hydrometra in a Toggenburg Doe, 431; Outbreak of Pneumonia in Calves, 431.

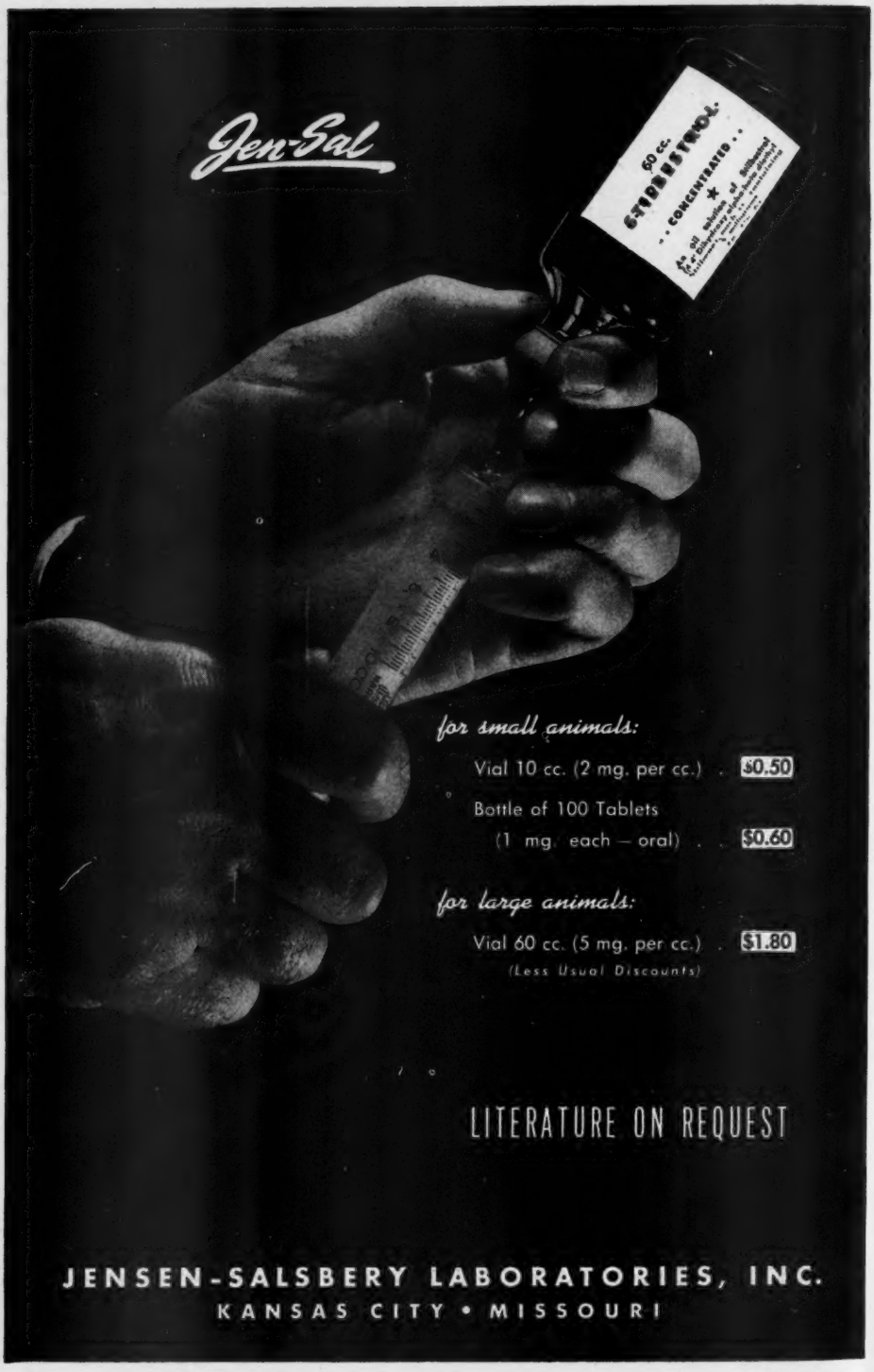
Book Reviews 432

Laboratory Methods of the United States Army, 432; Laffy, 432.

VOL. XXXIX
No. 11

Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879.

7833 S. Cranden Ave.
Chicago 49, U.S.A.


Jen-Sal
60 cc.
CYPIONESTROL
. . CONCENTRATED . .
for small animals:
Vial 10 cc. (2 mg. per cc.) . $0.50
Bottle of 100 Tablets
(1 mg. each — oral) . . $0.60
for large animals:
Vial 60 cc. (5 mg. per cc.) . $1.80
(Less Usual Discounts)
LITERATURE ON REQUEST
JENSEN-SALSBERY LABORATORIES, INC.
KANSAS CITY • MISSOURI

VETERINARY MEDICINE

Registered in U. S. Patent Office

VOL. XXXIX NOVEMBER, 1944 No. 11

Published Monthly by the
VETERINARY MAGAZINE CORPORATION
7632 S. CRANDON AVE., CHICAGO, ILL., U. S. A.

$4.00 a year; per copy 50 cents; Special Issues $1.00

All matter appearing in this publication is copyrighted. No part of it may be reproduced without specific permission. Permission will be given if the purpose is unobjectionable. If there be any question as to the propriety of reproduction the author will be consulted.

Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879. Entered as second-class matter under the title of American Journal of Veterinary Medicine July 19, 1910, at Chicago, Ill., under the Act of March 3, 1879.

D. M. CAMPBELL, *Editor*
7632 S. Crandon Ave., Chicago 49, Ill.
Telephone South Shore 7160

H. J. MOSTYN, *Eastern Representative*
P. O. Box 121, Sussex, New Jersey
Telephone Sussex 2F13

COPYRIGHTED, 1944, BY VETERINARY MAGAZINE CORPORATION

The 1944 wool clip is the smallest since 1936.

The only solution to the problem of the charlatan that is likely to be permanent is proving to the public that the qualified man is superior.

The organisms most sensitive to penicillin are, in the order named, Gonococcus, Streptococcus, *B. anthracis* and the clostridia. *Eber. typhosa* is slightly sensitive but coliform and tubercle bacilli are insensitive.

Clostridium chauvoei is the cause of a majority of the cases of blackleg in cattle, a minor portion of the cases in sheep, rare cases in swine, goats, camels, reindeer, whale and walrus. Exceptionally it affects the horse.—Londono in *Rev. de Med. Vet.*

Two English scientists have devised a hollow cone ultraviolet light that may be focused on the area surrounding the wound during an operation that will prevent germs from passing it and getting into the wound. At the same time, it does not expose the incised surfaces, the surgeon or his assistants to the rays.

An absorbent surgical dressing made of starch is proposed by Bice, McMasters and Hilbert of the Northern Regional Research Laboratory, Peoria, Ill. Sponges of starch may be prepared by freezing and drying. It is suggested they may be saturated with any desired medicament and applied to a surface, implanted in a wound or placed in the abdominal or other body cavity and left there to be slowly absorbed, thus releasing the medicament gradually.

We have need of back issues of VETERINARY MEDICINE—see page XVIII for list.

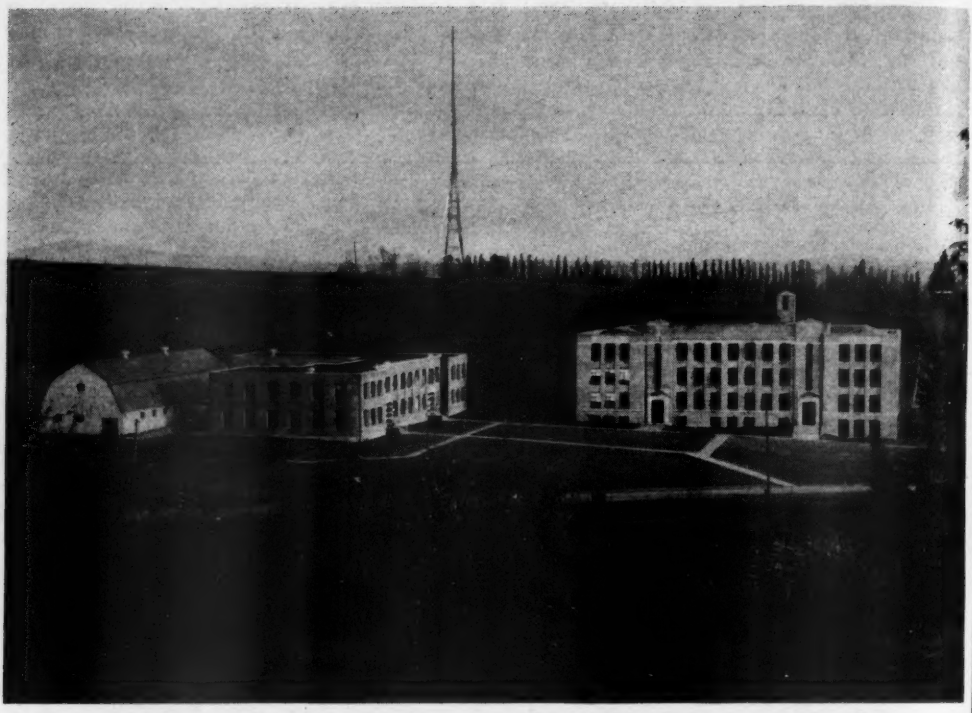
The inspected beef slaughter for August totaled 600 million pounds—an all time record. It was 28% higher than the July slaughter and 21% greater than August, 1943.

Zialciata and Mitchell (Univ. of Ill. Exp. Sta.) report: "Apart from differences in vitamin content corn oil and butterfat are essentially equal in growth promoting value for rats." This is contrary to earlier findings of research workers at the Wisconsin station.

It is estimated the average case of tuberculosis represents a community liability of approximately $10,000. Less than 6% of the families in which the disease occurs are financially able to meet this cost. Accordingly, the taxpayer is paying the bill for tuberculosis whether he realizes it or not.

Two thousand years ago urine was a favored mouth wash and dentifrice by the medical profession and it has retained its preference to the present day with the more ignorant of backward peoples. Now scientific research demonstrates the effectiveness of urea as a treatment for pyorrhea.

The freon gas "bomb" now being used with success against mosquitoes by the armed forces is, with slight modifications, equally effective against bacteria, according to officials of the U. S. Department of Agriculture. With it the air of offices, schoolrooms and other places of assembly may be freed of many varieties of germs.



BUILDINGS OF COLLEGE OF VETERINARY MEDICINE, STATE COLLEGE OF WASHINGTON

The three buildings in this picture are devoted entirely to the Veterinary College. The two buildings on the left are occupied by the animal clinic and the Department of Anatomy. The lower floor of the near, short wing of the two-story, brick building is occupied by the large animal clinic. The front of this wing is occupied by the operating room in which there is a sizable amphitheater where students and visitors may observe the work in surgery. The rear portion of this wing is the large animal treatment room provided with stocks, soak tubs, etc. Instrument and equipment rooms adjoin these clinic rooms and the men's dressing room with showers and lockers is located under the amphitheater. The frame building adjoining, connected by the covered passage, is the large animal hospital. In this building also are the garage and the autopsy room.

The first floor of the long, distant wing of the two-story, brick building is occupied by the small animal clinic, the small animal operating room, a room for minor surgery and medical cases. These rooms have terrazo floors, tiled wainscot and enamel painted walls, and are equipped with modern appliances. Drug, instrument and X-ray rooms are conveniently located.

The second floor of the long (distant) wing of this clinic building, houses the Department of Anatomy. A large recitation room occupies the front. The spacious, well lighted, well ventilated anatomy laboratory occupies the main portion of the wing. In the rear is the elevator, embalming room, and a room for refrigeration of anatomical specimens and four living rooms for the house surgeon, caretaker and student groups.

The central portion between the two wings of this building is occupied by anatomy offices, anatomy dressing room, recitation room, ladies dressing room and lounge, diagnostic laboratories and a dispensary.

The four-story building on the right, houses the teaching and research work. The ground floor of this building houses a large assembly room, smaller class room, and surgical museum. The east end is occupied by laboratories for advanced physiology and pharmacology.

The second floor, or main floor, at the east end contains reading rooms and administrative offices, in the center and rear laboratories for human physiology and in the west end laboratories for veterinary physiology and pharmacology. Washington Racing Commission laboratory for testing saliva is also located on this floor.

The third floor is devoted to veterinary pathology. It has a recitation room, large pathology laboratory, offices, diagnostic laboratories, laboratory for graduate study, and a fur animal, disease research laboratory.

The fourth floor is devoted to veterinary bacteriology and disease research. There is a recitation room, bacteriology laboratory, poultry disease research laboratory and a general disease research laboratory.

On the roof is a penthouse for housing limited numbers of experimental animals that are used in connection with teaching work. This animal room has its own ventilation system, independent of the rest of the building.

These buildings are located on the main highway from the city of Pullman. The area in the background is occupied by the Forestry Nursery and adds much to the beauty of the surroundings.

When the landscaping is completed this site will be one of the beauty spots on the campus of the Washington State College.

At the government experiment station at Beltsville, Md., 46% of the losses of pigs during the first six days after farrowing were due to uremia. The cause of the condition has not been determined.

A cup of tea contains about 10 micrograms of riboflavin. A cup of coffee contains about one microgram of nicotinic acid. A cup of meat extract contains about 0.2 microgram of riboflavin and 7 micrograms of nicotinic acid.

The Borden Award, a gold medal and $1,000, for the most distinguished contribution to poultry science during the past year was presented at the recent annual meeting in Chicago of the Poultry Science Association to Dr. Fred R. Beaudette, poultry pathologist at the New Jersey Agricultural Experiment Station.

More Grass Fed Beef

The number of cattle on feed for market, in the eleven Corn Belt States, August 1, was only 59% of the number on the corresponding date a year ago and the smallest since 1937. The reduction is believed to be approximately 700,000 animals. The falling off in numbers is largely in those on feed more than seven months.—*Nat'l. Provisioner.*

Seven hundred consecutive admissions to the North Carolina hospitals were given the skin test for trichinella infection. Seventy gave positive reactions. The incidence of trichinosis found by skin tests was greater than that found in routine necropsies in the same districts. The discrepancy is explainable either on the supposition that non-infected persons react to the test or lesions of the disease are missed in post-mortem examinations. The incidence of this disease (subclinical) in North Carolina is but little more than half the national average.

Effect of D D T on Animals

In a study of the toxic effects of the new insecticide DDT, the U. S. Public Health Service administered the preparation by inunction, by stomach tube and by admixture in the diet to 117 animals of nine species, including rats, rabbits, chickens, dogs, sheep, cows and a horse.

The only symptom produced was muscular tremors. Death resulted in the small mammals in from one to several weeks from a high level of administration. There were no appreciable microscopic lesions but microscopic examination revealed central necrosis of the liver consistently and, exceptionally, changes in the muscles and in the thyroid gland.

Runts among hogs average about one in 10; among sheep, one in 14 and among cattle, one in 25. Only when the breeding is good and prices are high, does it pay to feed a runt.

Frozen Food Industry Increases 600%

About 75 varieties of quick-frozen foods—meats, poultry, seafoods, fruits and vegetables are now being marketed. It is estimated the quick-frozen food industry will pack more than half a million pounds this year. As recently as 1930 only 80 thousand pounds were packed. Of the 1944 pack, 85% will be available for civilian use.—*Nat'l. Provisioner.*

The subcutaneous implantation of pellets of diethylstilbestrol in young turkeys of both sexes caused an increased deposit of fat in the carcasses, dressed 30 to 90 days later, as compared with controls, in an experiment at the University of California. The increased deposit of fat in these birds was not so great, however, as that caused by the injection of diethylstilbestrol in cockerels.

Foot-and-Mouth Disease in Peru

An outbreak of a malignant type of foot-and-mouth disease is reported from Lima, Peru. In a dairy herd of 100 cows, 17 died of the disease within five days. Col. Russell McNellis, V.C., loaned to the Peruvian Veterinary Service by the U. S. Army, reports that this is the first outbreak of malignant foot-and-mouth disease in the two and one-half years that he has been on his present assignment.

Sulfabenzamine is the name of a newly developed sulfa drug that is, according to an announcement by Dr. T. G. Klumpp, President of the Winthrop Chemical Co., superior to other sulfa combinations. Preparations containing this preparation were captured from the Germans in North Africa, who were using it to dust on wounds as a preventative and treatment for gas gangrene. The improved preparation will be marketed under the trade name "sulfamylon."

In research conducted by the Ontario Agricultural College, a meal made of 5 to 10% horn, 65 to 70% cattle hooves, and 20 to 30% calf and hog hooves was found satisfactory substitute for the meat meal in a starting ration for chicks. The constituents of the starting ration in which this meal was substituted for meat meal included 5% meat meal, 5% fish meal and 3% buttermilk powder. The horn and hoof meal was not satisfactory as a substitute for either the fish meal or buttermilk powder and was wholly inadequate as a substitute for all three sources of protein.

Veterinary Corps Safeguards Army Food Supplies

Counterpart of the United States Army's Medical system to safeguard the health of our soldiers, the Veterinary Corps has been fulfilling a vital mission in World War II by inspecting and supervising the receipt, storage and shipment of foods labeled for troop consumption.

Inspection of government installations for proper sanitation, storage and handling of all meat, meat-food, marine and dairy products, and all non-animal products, insures good health and maintains high standards for the United States Army.

Lt. Col. Robert J. Robertson of Glendale, California, head of the veterinary service in Southern England, has organized a smoothly-operating corps of experienced officers and enlisted personnel to cover the most important installations of the U. S. Army in the United Kingdom.

Responsible for the hygienic inspection of all meat and dairy foods and canned and packaged rations, Col. Robertson, as Division Chief, through the co-ordination of his proficient staff members, assists and advises the Chief Surgeon of the area in all matters pertaining to the veterinary service.

The Veterinary Corps personnel thoroughly examines and checks all food supplies at base, district, port, depot and unit installations. The immense task assigned to this small body of food inspectors reached a high level prior to and immediately following the invasion of the continent. The officer and enlisted personnel examined a total of 60,000 000 pounds of subsistence supplies in a single month.

And to illustrate the efficiency of the organization, approximately 8,000 pounds were segregated from the usable products due to deterioration of cans, cases or contents of products.

The veterinarian's job does not begin or end with the delivery of supplies to the unit user. The veterinary service functions as an individual section, or distinct unit of the Division, and accounts for the condition of all supplies bought, requisitioned, stored, handled or delivered by Quartermaster units responsible for subsistence.

The veterinary division's mission is to assist and advise the Chief Surgeon in all matters pertaining to the food supplies of animal origin that are supplied to troops and those that pertain to the protection of the health of the animals of the Army and the preservation of their physical condition.

The Veterinary Corps personnel comprises veterinary officers and enlisted men, who are classified as veterinary technicians or meat and dairy hygienists. In passing wholesome foods it is necessary that there be sanitary conveyance of supplies, proper refrigeration, thorough examination of all products and containers, inspections for age and deterioration and laboratory examination of all lots evidencing possible deterioration.

In order to facilitate proper conditions advice is given the Quartermaster Corps regarding required stacking and storage procedure of perishable items in order to allow maximum aeration and refrigeration.

The headquarters veterinary staff maintains a record of name of product, number of cans received, can size, number of cans inspected, establishment number, contractor, previous Veterinary Corps stamp, date of pack, results of inspection and recommendation as to disposition.

Food is classified by the Veterinary Corps as condemned, or unfit for human consumption, recommended for immediate issue or suitable for repacking, storage or shipment.

CAPTIONS FOR HALFTONES ON OPPOSITE PAGE

Top, left: Ice cream is the favorite confection of soldiers. Veterinary technician Cpl. U. J. Goeke of Dayton, O., supervises the manufacture of more than 500 gallons per week for the Port Area troops in a south English port

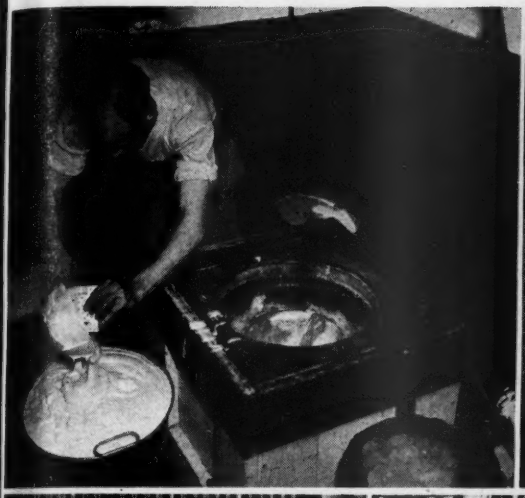
Top, right: Capt. Karl F. Steinback of Front Royal, Va., conducting laboratory tests for the veterinary inspectors, while Sgt. Harold Goldman of New Rochelle, N. Y., records technical data

Center, left: Inspection of frozen meat on arrival at an Army General Depot in England

Center, right: Maj. Robert B. Weeks of Kansas City and Capt. John A. Utterback of Midner, Colo., port veterinarians in the South of England, inspecting damaged food supplies to determine salvage possibilities. Captain Utterback will be remembered as an occasional contributor to the pages of VETERINARY MEDICINE, before assigned oceerseas in 1943. (Chemo-pathologic aspect of enteritis, March, 1942, p. 115; Chemical aspects of plasma therapy in veterinary medicine, May, 1942, p. 207; Fluid mechanism in health and in shock, Aug. 1943, p. 305; The management and healing of wounds, Dec. 1943, p. 449)

Bottom, left: Inspecting potatoes at Quartermaster General Depot in England. Food of other than animal origin is inspected by the veterinary service only on the direction of the Commanding Officer of an army installation

Bottom, right: Inspection of potatoes and onions at the breakdown point in a Quartermaster General Depot in England. Lieut. Joseph O. Simington (right) of Danville, Pa., is Depot Veterinarian



W-4158810-S

If the supplies are condemned the food is held in a locked compartment until turned over to the British Ministry of Food for use as animal feed if suitable.

During the course of work the Veterinary Corps makes a preliminary check to insure that oldest and most depreciated stock is to be shipped first. Then a further check is made to determine suitability for shipment, inspection of carrier vehicles, temperatures, segregation of various classes of food and the supervision of the loading.

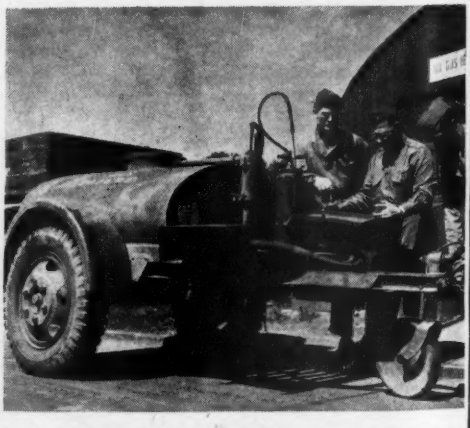
Inspection of subsistence supplies arriving at an invasion port. Cpls. Edwin Drangel, Hillsdale, N. J., and Frank E. Nealy, River Edge, N. J., veterinary technicians, are checking the contents of damaged cartons

Sgt. Eugene M. Oliver of Richmond, Va., veterinary technician, examining fowl arriving in a refrigeration van at a U. S. Army installation in England

Continuing the work the Veterinary Corps studies the sanitation of vehicles, cleanliness of personnel receiving the issue and eventually makes necessary corrections. The veterinarian further obligates himself to his assignment by making early morning inspections of closed warehouses to detect foreign odors. Off-odor or leaking cases are immediately removed, unpacked, inspected and properly channeled by classification and segregation.

The veterinarian's job is varied with never-ending tasks and assignments. He may check a "reefer" truck to examine proper stowage and evidence of freezer burns and thawing and refreezing, then hurry to a storehouse to supervise the handling of eggs and then proceed to the vegetable, dairy or ration departments of the Quartermaster section to inspect food deliveries to units.

All of this inspection in England and on the Western Front is, of course, in addition to inspection of all these products, and the plants in which they were processed at the time of procuremen by the Army. After the products are inspected, approved and purchased, the veterinary service is responsible that they are properly packaged and safely loaded in cars, boats, trucks or planes for transportation to the place where the Army is to use them or store them; in short, this service is responsible for the proper handling of food for the

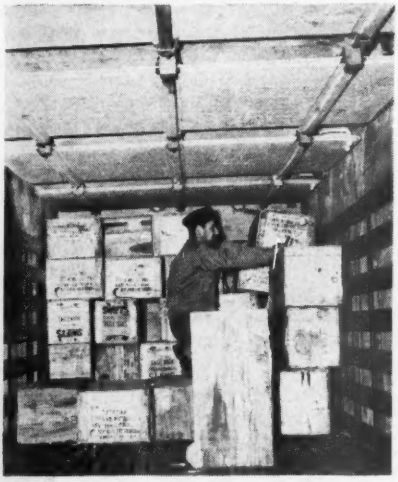


At large Quartermaster General Depots the Veterinary Section is supplied with a decontamination truck for use in salvaging food supplies that (in case gas warfare is employed by the enemy) have been contaminated by gas. Lieut. A. L. Swartz (center) in charge of this truck is checking his supplies preparatory to a practice demonstration

Routine daily inspection of a Quartermaster subsistence warehouse by Lieut. Donald O. Todd of Delta, O., and Sgt. Parker M. Smith of Meriden, Conn.

Army all the way from the farm or factory where it is produced to the soldier—perhaps thousands of miles distant, who eat it, perhaps many months later.

And while this inspection continues at every post and installation the officers coordinate their efforts and functions in order to have perfect cooperation between the veterinary



Lieut. H. W. Glass of New York City, Depot Veterinarian somewhere in England, checking the temperature of a reefer truck being loaded with subsistence supplies

activities of the Air Corps, Tactical Force, and Service of Supply services in the base area.

The veterinarian maintains liaison with the British army and civilian veterinarians regarding the prevalence of disease in animals communicable to man in the vicinity of all U. S. Army installations.

Regardless of the mission, be it the care and treatment of guard dogs, pigeons, guinea pigs or work animals, or the inspection of food of animal origin, and all foods of non-animal origin upon request of the Quartermaster Corps or the recommendations to the Chief Surgeon pertaining to subsisitence decontamination, the veterinarian inspects . . . whether it be at the initial acquisition by the United States Army or later in the warehouse or cold storage. . . .

Army Combats Hog Cholera in Italy

A characteristic of Army veterinary service is its variety. The experience of the Army veterinarians when our troops landed in Italy is a case in point. They landed in an area in which a disastrous outbreak of hog cholera was raging. Serum and virus was hastily obtained by plane from the United States and Italian veterinarians mobilized to vaccinate the animals under the direction of the Army veterinarians. As there was to be a continuing need for anti-hog cholera serum, an old serum plant was repaired and equipped. Local requirements of serum and virus were soon supplied from this source, which is continuing the manufacture of these products.

Unusual experiences of veterinary officers in North Africa and in India have already been mentioned in these pages.

Ice Cream for Airmen

The crews of army airplanes seldom eat their breakfasts before starting on a combat mission. The start is usually made one to several hours before daylight and the men are high strung, nervous and apprehensive. They fly for many hours and return often too exhausted to eat. As a result nearly all lose weight rapidly and their endurance is reduced.

Many things have been tried to induce them to eat a substantial breakfast before embarking on a long flight. Tempting them with ice cream was found more successful than anything else both before and after long flights.

Much the same condition prevails with the ground crews. These men work at high tension, often for 24 hours at a stretch, stopping only for coffee and, not infrequently, for 48 hours without stopping except to drink a cup of coffee occasionally and eat a meat sandwich. They work under high tension and the burden of responsibility is great. When the job is done they have no appetites and want to sleep around the clock. Again ice cream, better than any other food, induces them to take some much needed nourishment. Frozen chicken is the second next most successful food in coaxing an appetite.

Powdered whole milk or evaporated milk is used in making the ice cream.

Regulations for the Movement of Livestock

By S. L. STEWART
Olathe, Kansas

THAT livestock sanitary measures to be effective in limiting the spread of infectious diseases and parasites of domestic animals must control the intrastate and interstate movement of diseased animals, is universally recognized by livestock sanitarians.

That restrictions on the movement of livestock is an inconvenience, a nuisance and an expense to the livestock industry is indisputable.

Therefore regulations restricting the movement of livestock have two objectives. (1) To prevent the spread of infection by diseased animals and (2) to be so formulated as to cause the least possible annoyance and expense to the owners of the animals and yet be compatible with the first objective.

That neither of these objectives has been attained, is abundantly evident. This is not a discovery of my own. For some 30 years, the U. S. Live Stock Sanitary Association has had a committee on "Uniform Regulations" that has pointed out, year after year, the need for improvement in the regulations for the interstate transportation of animals. Only meager success has attended its efforts. The fact is notorious that a number of states enforce regulations for animals coming into them by rail, but pay little or no heed to those trucked in. Again, examples are plentiful of states that quarantine animals that cross their borders without health certificates but are indifferent to the movement of similar animals across county lines or anywhere within the state. It is perhaps not surprising that the sincerity of such regulations have sometimes been questioned.

The regulations designed to control brucellosis of cattle afford glaring examples of inconsistencies, obsolete provisions and requirements that hinder instead of help the work of control and eradication of this disease. This I have already discussed in some detail.[1] The control and eradication of brucellosis requires the cooperative efforts of four groups—the federal Bureau of Animal Industry, the state livestock regulatory authorities, veterinary practitioners and the livestock owners. Regulations under which the work is prosecuted should be the result of their combined wisdom. It is a cardinal principal that the condemnation of a valuable reacting cow when she can be rendered serviceable and safe by vaccination cannot be justified, morally or economically. Regulations that, directly or *indirectly*, require the condemnation and slaughter of such cows are wrong.

[1] Stewart, S. L., Control brucellosis now. *Vet. Med.*, 39:7, p. 285, 1944.

It seems to me there should be only one, instead of several plans, for the control and eradication of brucellosis. Enrolling a herd under the plan should be voluntary on the part of the owner, but once enrolled, every female animal and the bulls in the herd and all accessions by birth or purchase should be subject to the brucellosis regulations so long as the herd remains in the plan. Most of those herds will be free from the disease, and the positive reactors will have been replaced, in four or five years from the beginning of herd control, but the herd should remain under supervision as a protection against reinfection. Complying with the regulations would, of course, entail some inconvenience but no real hardship to herd owners, and they would be repaid well for their efforts. From my experience I believe they will agree, 100% willingly, to reasonable restrictions if shown that such are necessary. Cattle owners have already demonstrated their willingness to accept reasonable regulations.

The Federal Bureau of Animal Industry should be the final authority in the project, with full control of the interstate movement of animals from herds enrolled in the plan. State authorities should not set up different regulations for the importation of animals. To do so destroys any chance of uniform requirements. The state livestock sanitary authorities should control and supervise the work within the states, through the veterinary practitioners. The immediate supervision of the herd enrolled in the brucellosis control and eradication project should be vested in a local veterinary practitioner of the cattle owner's selection, insofar as that is practicable.

Any removal of cattle from a herd enrolled in the brucellosis control and eradication project should be on permit from the veterinarian in charge; such permits being revocable for cause by the state or federal authorities. The herd owner should keep a record of his herd on prescribed forms which should be inspected periodically by the veterinarian in charge of the herd, and approved or corrected and signed by both him and the herd owner. When an animal is sold into another herd a transcript of her record should go to her new owner. Drawing samples for the blood test should be performed by the veterinarian in charge of the herd; whether he, or a state laboratory, tests the samples is perhaps unimportant. Personally, I prefer to test my own

samples; matters arise frequently that are difficult to explain to a laboratory technician having no knowledge of the herd. If every state maintained a laboratory for testing and the regulations were the same in all states, there would be advantages in having the testing done in a central laboratory. In any case, the blood test should be for the purpose of supplying the veterinarian in charge of the herd with information and should not be considered as supplying a diagnosis for him.

The responsibility for the selection of animal replacements or for additions to other herds will not be misplaced if put upon the local practitioner who is better able than anyone else to make the selection and must live with his mistakes if he makes them.

The objective is, or should be, to eradicate bovine brucellosis from the whole of the United States in the shortest practical time with the least possible cost to the owners of cattle consistent with rapid progress. The regulations should be designed solely to accomplish this. There are four factors involved—the federal Bureau of Animal Industry, the state livestock sanitary authorities, veterinary practitioners and cattle owners. Each should work in complete cooperation with each of the others. Each has his sphere of action and his responsibilities. None should presume to omnipotence in the field of another. It would be farcical for me to assume responsibility for interstate shipment of animals or supervision of the manufacture of biological products and it is equally absurd for one to sit in Washington (or Topeka) and assume responsibility for the supervision of a herd in my territory that I have visited perhaps weekly for 20 years and know more about in a minute than any absent administrator can ever learn by studying reports. We have a job to do and it will require the best efforts of all four of us. Let's get busy and do it in a mutually cooperative and mutually respectful scientific manner.

Cattle Holding Chutes Aid in Disease Control

Robert E. Dunn, Federal veterinarian stationed in Montana, has helped solve the problem of restraint of cattle for examination or bleeding by designing and building a portable holding chute. Mounted on a two-wheeled trailer, the chute can be coupled to an automobile and taken to corrals where it can be set up for operation with little delay. Use of this device, which is equally well adapted for dehorning, vaccinating and other operations, has enabled Doctor Dunn to obtain blood samples from 600 range cattle in a day. This is several times the usual number obtained when an ordinary chute is used. The Montana Livestock Sanitary Board, Helena, has prepared plans of the chute for distribution. It embodies no new principles and can be built by persons of moderate mechanical skill.

★ ★ ★ ★

★ ★ ★ BUY WAR BONDS ★ ★ ★
AND HOLD THEM

★ ★ ★ ★

Absorption and Storage of Vitamins

Vitamin A is readily absorbed from the intestinal tract. The liver may contain more than 90% of the vitamin A present in the body. It is carried in the blood stream throughout the body.

Vitamin B_1 is absorbed from the intestinal tract, is not stored in the body, and the excess is excreted through the urine.

Free forms of riboflavin appear to be phosphorylated in the intestines before absorption occurs. It plays a part in fat and protein metabolism. It is excreted through the feces and, if in large quantities, through the urine.

Nicotinic acid or amide is absorbed directly from the food, is not stored in the body, and it and its metabolic end products are excreted through the urine.

Vitamin C, too, is absorbed rapidly from the intestinal tract, has no special place of storage, and is excreted in the urine and through perspiration.

Vitamin D can be absorbed through the skin, and also through the intestines. It is carried by the blood stream to the tissues, and is excreted through the bile and intestinal tract.

Vitamin E is absorbed from the intestinal tract in the presence of bile. It is found in the blood stream in amounts proportionate to the intake. It is stored in moderate amounts in fat and muscle, is broken down in the organism, and the paths of excretion are uncertain.—*Apothecary* 55:9, 1943.

Susceptibility of Animals Other Than Solipeds to Infectious Anemia

By C. D. STEIN and L. O. MOTT*
Washington, D. C.

WHILE most authors agree that equine infectious anemia under natural conditions is a specific disease of solipeds (the horse, mule and donkey), a considerable difference of opinion exists among investigators as to the susceptibility of other species under experimental conditions.

According to Carré and Vallée,[1] the ass is somewhat more resistant to the disease than the horse. Theiler and Kehoe[2] reported that clinical symptoms of the disease in mules and donkeys are not marked. Balozet[3] reported from Tunis, North Africa, that the African ass is as susceptible as the horse but that symptoms are more apparent in the horse. De Kock[4] reported a natural outbreak of infectious anemia in donkeys in Natal, South Africa, that assumed a rather virulent character. The Japanese Commission[5] reported that when the ass contracts the disease, it usually follows an acute, fatal course. Investigators in the Bureau have experimentally infected the horse, mule, and donkey but found that the mule was somewhat more resistant than the horse.

A review of the literature, while not complete, and citation of our own previous experiments on transmission of infectious anemia to species other than equines will illustrate the variability of opinion that exists on this question.

According to Kral, Macek, and Sobra,[6] swine, rabbits, guinea pigs, poultry and man are slightly susceptible to the disease but other domestic animals are refractory. Two cases of the disease in man, that of Luhrs and Peters, verified by reinfection of horses, are cited by Verge[7] who believes that the infection is only exceptionally transmissible to man.

The Japanese Commission[5] reported that outside of the equine family, pigs are most susceptible, while young goats and sheep may show slight febrile reactions; calves, dogs, rabbits, guinea pigs, and rats have no susceptibility. Carré and Vallée[8] reported that cattle, sheep, goats, dogs, rabbits, guinea pigs, white rats and mice proved to be refractive to infection. Francis and Marsteller[9] were unable to transmit the disease to cattle, sheep, goats, pigs or dogs. Todd and Wolbach[10] likewise failed to infect sheep, dogs, kittens, guinea pigs, rabbits or mice. Balozet[11] reported that a monkey, sheep, fowls, rabbits, rats and guinea pigs were not susceptible to infectious anemia. Rastegaeva, Sirotkin and Artimova[12] failed to transmit the disease to guinea pigs or rabbits. Orlov[13] failed to transmit the infection to geese or ducks. Ginden[14] reported no significant histological changes in the livers of pigeons injected with the virus of infectious anemia. De Kock[4] was unable to infect sheep or dogs. Charlton[15] reported that cats injected with virulent blood showed illness but that their blood was not infectious to horses. Van Es, Harris and Schalk[16] reported temperature reactions and deaths in some of the guinea pigs injected with virulent blood but blood from the affected guinea pigs failed to produce reactions in healthy horses.

Formina[17] reported that horses could not be infected with blood from rabbits that had reacted following injection of washed red corpuscles from an infected horse.

Martin[18] reported a slight thermic attack in a monkey 55 days subsequent to injection of virulent serum, but injection of the monkey's serum into an ass did not produce any reaction and he concluded the monkey was refractory to the virus. He also reported that no signs of illness occurred in three lions confined in a zoological garden that were fed on the carcasses of asses infected with infectious anemia.

Auermann[19] reported that 2 of 9 sheep from 5 to 7 months of age developed a general reaction following injection of virulent serum, but he concluded that sheep are unsuitable for test animals.

Luhrs[20] reported that pigs may be made virus carriers by injection of virulent material. This was confirmed by Habersand,[21] Kutsche[22] and De Kock.[4]

Kobe[23] reported transmission of the disease to splenectomized piglets ranging in age from 4 to 6 weeks by intravenous or subcutaneous injection of virulent blood from horses in the pyrexial stage of the disease.

Semenov and Oldenborger[24] reported that the filtered sera from pigs showing symptoms suggestive of infectious anemia and kept on a farm where the disease existed, produced symptoms of the disease in young pigs and guinea pigs when injected into these animals. However, the virus was not tested in horses.

In this connection, it is interesting to note that Donatien and Lestoquard[25] have described a form of infectious anemia in sheep and

*Pathological Division, Bureau of Animal Industry, Agricultural Research Administration.

goats due to a filterable virus and transmissible to the ass and calves.

In early experiments[26] conducted by the Bureau, solipeds only were found to be susceptible to infectious anemia. Attempts to infect calves, sheep, swine, dogs, rabbits and guinea pigs were without success.

In more recent experiments,[27] attempts were made to transmit the disease to different kinds of laboratory animals by various methods of inoculation. Although a large number of mice, rats, guinea pigs and rabbits, and limited numbers of pigeons were inoculated by various methods using whole blood, defibrinated blood, blood serum and filtered serum, from both acute and chronic cases of infectious anemia in horses, the infection could not be transmitted to these animals.

The inoculation of young, healthy horses constitutes the only certain method of determining whether or not material contains virus. Therefore, one of the greatest obstacles encountered in the study of the various problems associated with the control of infectious anemia has been the lack of a suitable domestic animal, other than solipeds, or a laboratory animal to which the disease could be easily transmitted.

Since we had isolated a highly virulent strain of virus which, in high dilution, was capable of producing the disease in horses in an acute, fatal form, it was believed that this virus might be infectious for very young animals of other species and the following described tests were set up and carried out.

Materials and Methods

The exposure virus used in these experiments was obtained from blood samples forwarded to the Pathological Division by Dr. F. H. Melvin, in charge of the Bureau of Animal Industry field station at Cheyenne, Wyoming. The samples were collected by Dr. L. A. Marshall, a Bureau field veterinarian, from subacute cases in an infectious anemia outbreak in Wyoming during March, 1941.

Previous experiments with this strain of virus reported elsewhere[28] had shown it to be unusually virulent. Small amounts, on third passage, produced the disease in the acute or subacute form after a short incubation period in susceptible horses. Titration tests, on the third passage of this virus, indicated that it was capable of producing an acute fatal form of the disease in dosages and dilutions as low as 1cc of 1 to 1,000 of the filtered serum. On fifth passage, when injected subcutaneously into horses in 10cc doses, it had an incubation period of eight to 10 days and produced death in 31 to 37 days. On sixth passage, needle pricks made in the skin of a normal horse with a hypodermic needle that was first contaminated with virus by inserting it under the skin of a horse infected on fifth passage, also produced an acute fatal form of the disease.

The domesticated animals used in tests consisted of calves 5 to 8 months of age, lambs, 3 to 4 months of age, 5-month-old pigs, 18-month-old dogs and kittens 3 to 4 months of age.

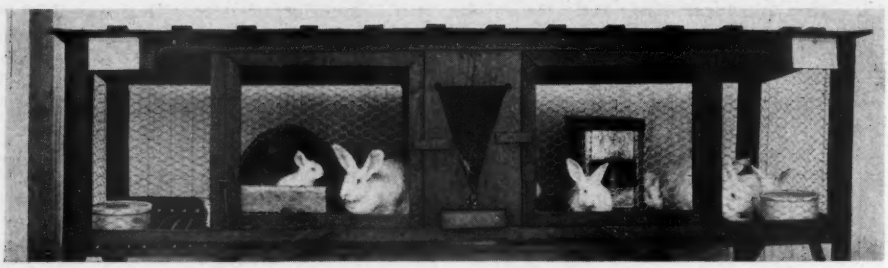
The laboratory animals used in the experiments consisted of young and large adult rabbits, young and large adult guinea pigs, white rats, white mice and pigeons.

The susceptible horses used in the experiments were of the light type, weighing approximately 900 to 1100 pounds and, like the other large domestic animals, were held under observation in screened isolation stables provided with concrete floors. As far as can be determined, none of the normal animals used in transmission tests had any previous contact with horses affected with infectious anemia. Temperatures on all the large test animals were taken and recorded at least twice a day and, on the large rabbits and guinea pigs, at least once a day for a period of three months. Test animals were all injected subcutaneously with the same strain of filtered *virulent* horse serum which had been passed through No. 8 Mandler filter candles and tested for sterility. At least one control animal for each species was likewise exposed to the same lot of sterile filtered *normal* serum. Horse inoculation tests for the presence of virus were made on the blood of those test animals, except rabbits, that showed reactions following exposure to the virus.

Post-mortem and histological examinations were made for indications of infectious anemia in the test animals.

Infectivity Tests on Horses of Exposure Virus W1320.—As a control test on the virulency of the filtered horse serum obtained from the source horse, No. 1320, affected with acute infectious anemia, two normal horses, Nos. 1266 and 1267, were each inoculated subcutaneously with 10cc of the virulent serum. After a short incubation period (8 to 10 days) both of the animals developed an acute, fatal form of the disease, indicating that filtered serum W1320, used as exposure virus in the following tests, was highly virulent.

Transmission Experiments on Calves, Lambs, Pigs, Dogs and Cats.—Filtered virulent horse serum W1320 was injected subcutaneously in 5cc amounts into each of two normal calves, three normal lambs, two splenectomized pigs, one normal pig, two normal dogs and two normal kittens, while 5cc of filtered sterile normal horse serum 1066 was injected subcu-



Among the animals used in the experiment were both young and adult rabbits

taneously into the following normal animals as controls: one calf, one sheep, one pig, one dog and one kitten.

Results of Injections

Calves.—Both of the calves injected with filtered virulent serum W1320 developed a temperature reaction on the 4th day. The initial reaction in both calves was followed by three additional intermittent febrile attacks within a period of 30 to 40 days. Aside from the temperature reactions mentioned, no other clinical symptoms developed in either calf over a period of 148 days. On the other hand, the calf that was injected with filtered normal horse serum remained normal 148 days.

The two test calves and the control calf were destroyed and subjected to post-mortem and histological examinations, both of which failed to reveal lesions or alterations in the tissues indicative of infectious anemia.

A normal horse, No. 1249, when injected subcutaneously with 200cc of pooled blood collected on the 148th day from the two calves that reacted, failed to develop infectious anemia after a period of two months but, when injected with 20cc of virus of known virulency, developed symptoms of the disease in 10 days, indicating that the two reacting calves were not carriers of the virus on the 148th day.

Sheep.—Two of the three sheep injected with filtered virulent serum W1320 developed a temperature reaction on the 4th day. The initial reaction in both sheep was followed by 4 to 5 intermittent temperature reactions within 30 to 35 days. The 3rd sheep developed a temperature on the 9th day subsequent to injection of the virus, followed by a second reaction on the 13th day. Aside from the temperature reactions, no other clinical symptoms of infectious anemia developed in any of the three test sheep. The control sheep, injected with filtered normal horse serum, remained well until the 146th day of the test when it developed a respiratory disturbance. On the 128th and 133rd days of the test, a respiratory disturbance also developed in two of the three reacting test sheep that received virulent serum and one sheep died of pneumonia.

The two remaining test sheep and the control sheep were destroyed on the 148th day of the test. One of the test sheep and the control sheep revealed lesions of pneumonia on post-mortem examination but none of the animals showed lesions or alterations in the tissues indicative of infectious anemia.

A normal horse, No. 1272, was injected with 170cc of pooled whole blood collected from two of the reacting test sheep on the 148th day but failed to develop any symptoms of infectious anemia in two months. However, when horse No. 1272 was injected with virus of known virulency it developed acute infectious anemia in nine days and died on the 15th day, indicating that the two reacting test sheep were not carriers of the virus. It was, therefore, concluded that the respiratory disturbance that developed in two of the test sheep and the control sheep during the latter part of the test period was apparently an intercurrent infection and not due to infectious anemia virus injected.

Pigs.—One of the two splenectomized pigs injected with filtered virulent horse serum W1320, showed a temperature reaction on the 8th day which persisted for two days and reached a maximum of 105.6° F. No other symptoms developed in this animal during the test period of 148 days.

The other splenectomized pig and the non-splenectomized pig injected with virulent serum as well as the control pig injected with sterile filtered normal horse serum, remained well for a period of 148 days.

All the animals were destroyed on the 148th day but showed no lesions or pathological alterations indicative of infectious anemia.

A normal horse, No. 1265, injected with 300cc of pooled whole blood collected on the 148th day of the test from the reacting test pig and one of the non-reacting test pigs that had received virus, remained normal for a period of two months but when exposed to virus of known virulency, developed the disease in an acute form on the 9th day, indicating that

the pigs were not carriers of the virus on the 148th day following exposure.

Dogs.—The two dogs injected with filtered virulent horse serum W1320 and the control dog injected with filtered normal horse serum remained normal for 148 days. No lesions or pathological alterations suggestive of infectious anemia were found in the tissues of the dogs on post-mortem and histological examinations.

Kittens.—The two kittens injected with virulent horse serum both developed a temperature reaction on the 2nd day, followed by a second temperature reaction in one of the kittens on the 10th day. No other symptoms occurred during 148 days. The control kitten, injected with filtered normal horse serum, remained well for 148 days. A normal kitten was then injected with 2cc of blood from one of the reacting test kittens and it developed a fatal septic infection. It, therefore, appeared that the reaction in the test cats had been due to an intercurrent streptococcus infection and consequently the first test was considered a no test. The test on kittens was repeated.

Two normal kittens were again injected subcutaneously with 5cc of filtered virulent horse serum W1320 and one control cat with 5cc of filtered normal horse serum 1066. The two test kittens, as well as the control kitten, remained normal for a period of 90 days, when they were destroyed along with kittens in the original test at 148 days. On post-mortem and histological examination, none of the kittens showed lesions or pathological alterations in the tissues characteristic of infectious anemia.

A summary of these experiments is given in Table I which, in addition to recording the first four passages of the exposure virus through horses direct from its source, also shows the results obtained on the fifth passage into horses and other species of animals and on the sixth passage when attempts were made to pass it from reacting animals of various species back to horses.

Transmission Experiments on Laboratory Animals

Filtered virulent horse serum W1320 was injected subcutaneously into each of six white mice in 0.25cc doses, into each of eight white rats in 0.5cc doses, into each of three young rabbits, four large adult rabbits, four young guinea pigs, four large guinea pigs, two large splenectomized guinea pigs and four pigeons in 2 to 3cc doses and intraperitoneally into two large splenectomized guinea pigs in 2cc doses.

As controls, two animals of each species in each group were each injected subcutaneously on the same date as the principal test animals with like amounts of filtered sterile normal horse serum 1066.

Results of Inoculations

The rats and mice, injected with virulent horse serum and with the filtered normal horse serum, all remained normal for a period of 95 to 111 days. No lesions or pathological alterations suggestive of infectious anemia were found in the tissues of these animals on post-mortem examination.

Three of the four pigeons injected with virus, remained normal for 95 days, whereas the fourth pigeon that received virus was attacked and injured by the other birds on the 16th day and died as a result of these injuries the 42nd day after injection. The two pigeons

TABLE I—ATTEMPTS TO PASS VIRUS FROM A FIELD CASE THROUGH HORSES AND OTHER SPECIES OF ANIMALS

Origin	1st Passage	2nd Passage	3rd Passage	4th Passage	5th Passage		6th Passage	
Wyoming Field Case	Filtered Serum Subcutaneously	Filtered Serum Subcutaneously	Filtered Serum Intravenously	Horse-fly Bites	Filtered Serum Subcutaneously to Horses and Other Species		Blood Subcutaneously to Horses	
					Species of Animal	Results of Injection	Horse No.	Results of Injection
Horse acute.. field case	Horse ..1298.. acute	Horse ..1297.. acute	Horse ..1246.. acute	Horse ..1320.. acute	....Calf normal ....Calf normal	Temp. reaction..... Temp. reaction.....	1249	No reaction*
					....Lamb normal ....Lamb normal ....Lamb normal	Temp. reaction..... Temp. reaction..... Temp. reaction.....	1272	No reaction*
					....Pig splenect. ....Pig splenect. ....Pig normal	Temp. reaction..... No reaction..... No reaction.....	1265	No reaction*
					....Dog normal ....Dog normal	No reaction No reaction		
					....Cat normal ....Cat normal	No reaction No reaction		
					....Horse 1266 ....Horse 1267	Acute, fatal case Acute, fatal case	..1312	Acute, fatal case

*Susceptibility confirmed by exposure to virus of known virulency.

receiving filtered normal horse serum remained normal for 95 days. Post-mortem examination of the test and control pigeons showed no lesions suggestive of infectious anemia.

Three of the four young guinea pigs inoculated with virulent horse serum showed a marked decrease in weight during a 32-day period following injection and one of the guinea pigs was visibly sick. 1cc of whole blood from each of the three guinea pigs was subinoculated into each of one or two normal guinea pigs but none of these animals showed a loss in weight or developed any clinical symptoms suggestive of infectious anemia in three months. 10cc of pooled whole blood from two of the reacting guinea pigs was also injected subcutaneously into normal horse 1259. Horse 1259 remained normal for a period of 63 days but, when injected with virus of known virulency, developed symptoms of infectious anemia in 10 days, indicating that the guinea pigs were not virus carriers. The two control guinea pigs that received the filtered normal horse serum remained well for three months.

One of the large, splenectomized guinea pigs and one of the large, non-splenectomized guinea pigs that were injected with virulent horse serum lost weight rapidly and died in seven and 14 days, respectively. On the other hand, three of the four large splenectomized guinea pigs and three of the four large, non-splenectomized guinea pigs, injected with virulent horse serum, and the two large, splenectomized guinea pigs and the two large, non-splenectomized guinea pigs, injected with filtered normal horse serum, all remained well for a period of 49 days. No lesions or pathological alterations suggestive of infectious anemia were found in the tissues of these animals on post-mortem examination.

Three of the four large rabbits, inoculated with virulent horse serum, developed a mild temperature reaction on the 5th to 9th day but showed no other clinical symptom indicative of infectious anemia. Serial passage transmission of the infective agent causing temperatures in the original three rabbits was unsuccessful in normal rabbits. The two large, control rabbits remained normal for 95 days. On post-mortem examination, all of the four test rabbits were normal.

Two of the three small test rabbits that received virus remained normal for 95 days; the 3rd test rabbit showed a partial paralysis and gumming of the eyes on the 6th day. This animal returned to normal before conclusion of the test period.

No lesions or pathological alterations suggestive of infectious anemia were found on post-mortem examination in either the test or control rabbits.

Summary and Conclusions

1. The literature, including early and recent studies by Bureau investigators on transmission of infectious anemia in solipeds and other animals, is briefly reviewed.

2. Two normal horses, after a short incubation period, developed an acute, fatal attack of infectious anemia while two 5-month-old calves, two 3-month-old lambs, one 4-month-old lamb and one of two 5-month-old, splenectomized pigs developed febrile reactions in 4 to 9 days following subcutaneous inoculation of virulent filtered blood serum from the same source horse affected with acute infectious anemia. Aside from the temperature reactions, no other clinical symptoms of infectious anemia developed in any of the reacting animals except the horses. Horse inoculation tests for the presence of virus, made on the blood of the reacting animals other than horses collected 148 days after exposure, were negative indicating that none of the animals were carriers of the virus.

3. One 5-month-old, splenectomized pig, one 5-month-old, non-splenectimized pig, two 18-month-old dogs and two 3-month-old kittens failed to develop any clinical symptoms indicative of infectious anemia following subcutaneous injection of virus.

4. Three of seven rabbits, injected with the virulent, filtered, infectious anemia horse serum, developed a mild temperature reaction between the 5th and 9th day but otherwise showed no clinical symptoms indicative of infectious anemia. Serial subinoculation passages on rabbits were made without producing any clinical manifestation of disease.

5. Three of four young guinea pigs, injected subcutaneously with virus, showed a marked decrease in weight and one of the test animals was visibly sick. However, six normal guinea pigs and a susceptible horse remained normal when injected with their blood.

6. Two large, mature guinea pigs, one splenectomized and one non-splenectomized, that received virus subcutaneously, showed a rapid loss of weight and died in 7 and 14 days, respectively, after exposure.

7. One small guinea pig, three large guinea pigs, three large, splenectomized guinea pigs, one large rabbit, four small rabbits, eight white rats, six white mice and three pigeons, injected subcutaneously with the same virus, failed to develop any symptoms of infectious anemia.

8. Control animals representing each species used in the tests, when injected subcutaneously with filtered normal horse serum, remained normal.

9. A post-mortem examination of the car-

cass and a histological examination of the tissues of the reacting animals failed to reveal lesions or pathological alterations indicative of infectious anemia.

10. The results of these experiments indicate that the subcutaneous injection of a highly virulent strain of infectious anemia virus into calves, lambs, splenectomized pigs and rabbits may be followed in some instances by temperature reactions and, in splenectomized or normal guinea pigs, by loss of weight, visible sickness, and even death. However, since (1) none of the reacting animals developed the typical, clinically recognizable syndrome of infectious anemia, (2) post-mortem examination failed to reveal lesions indicative of infectious anemia, (3) histological examination was negative for the presence of significant pathological alterations and (4) horse inoculation tests demonstrated that none of the reacting animals remained carriers of the virus, it was concluded that the virus did not reproduce itself in the heterologous host species and that none of the animals used were suitable for diagnostic test animals nor satisfactory for carrying on other types of experimental work with the virus of equine infectious anemia.

Acknowledgment

The authors wish to acknowledge with gratitude the valuable assistance of Captain R. L. Knudson* in the splenectomizing of pigs and guinea pigs. We are also indebted to Captain C. L. Davis* for the histopathological examination of tissues collected from the test animals.

References

1. Carré, H. J. and Vallée, H. P., Sur l'anémie infectieuse du cheval, Compt. Rend. Acad. Sci., 139:26, pp. 1229-1241, 1904.

2. Theiler, A. and Kehoe, D., Infectious or pernicious anemia of equines in South Africa. The Third and Fourth Reports, Director of Veterinary Research, Department of Agriculture, Union of South Africa, pp. 217-289, Nov., 1915.

3. Balozet, L., Sensibilité de l'ane africain à l'inoculation en virus de l'anémie infectieuse, C. R. de la Soc. de Biol., 119:62, 1935.

4. De Kock, G.V.D.W., A contribution to the study of the virus, haematology, and pathology of infectious anemia of equines under South African conditions, Union of South Africa, 9th and 10th Reports, Dir. of Vet. Education and Res., pp. 253-313 (Apr.), 1923.

5. Japanese Commission (Horse Administration Bureau, Tokyo, 1914), Report on the results obtained by the Special Committee for Investigation of Infectious Anemia of the Horse, *Vet. J.*, pp. 604-627, Dec., 1914.

6. Kral, F., Macek, K., and Sobra, K., Equine infectious anemia, *Klin. spisy. Sk. Zverolek*, Brno, 11, pp. 25-218, 1934.

7. Verge, J., L'anémie infectieuse des equides, maladie de Vallée, *Rec. de Méd. Vét.*, D'Alfort, 109:11, pp. 796-838, 1933.

8. Carré and Valleé, Récherches clinques et expérimentales sur l'anémie pernicieuse du cheval, *Rev. Gén. Méd. Vét.*, 4-1904, 5-1905, 8-1906, 9-1907.

9. Francis, F. and Marsteller, R. P., Infectious anemia of the horse, Texas Agr. Exp. Sta. Bul. 119 (Dec.), 1908.

10. Todd and Wolbach, The swamp-fever of horses, *J. Med. Res.*, Boston, 24, p. 213, 1911.

11. Balozet, L., Études expérimentales sur l'anémie infectieuse des equides, Arch. Inst. Pasteur, Tunis, 26, pp. 27-35, 1937.

12. Rastegaeva, A. M., Sirotkin, V. A. and Artimova, A. I., Diagnosis of swamp fever in artificially infected laboratory animals. *Sovyet Vet.*, No. 7, pp. 31-33, 1939.

13. Orlov, F. M., Susceptibility of ducks and geese to infectious anemia, *Sovyet Vet.*, No. 6, p. 20, 1939.

14. Ginden, A. P., Biological diagnosis of equine infectious anemia from fowls and pigeons, Trud. vsisojuz. Inst. eksp. Vet., 12, p. 67-77, 1936.

15. Charlton, Swamp-fever. Ann. Rep. of the Dept. of Agr. of the Prov. of Saskatchewan, Regina, p. 146, 1906.

16. Van Es, L., Harris, E. D., and Schalk, A. F., Swamp fever in horses, Bul. 94, N. Dakota Agr. Exp. Sta., 1911.

17. Formina, A. Y., Attempts to infect rabbits with the virus of equine infectious anemia, *Sovyet. Vet.*, No. 6, p. 11-15, 1939.

18. Martin, L. A., L'anémie infectieuse des equides, Arch. de L'Institut Pasteur du Maroc. T. II, Fasc. 2, pp. 289-294, Oct., 1940.

19. Auermann, B., Bersuche über die Empfanglichkeit von Jungschafen fur das Virus der infektiösen Anamie der Pferde (Susceptibility of young sheep to the virus of equine infectious anemia), Inaug. Diss., Hanover, pp. 47, 1936.

20. Luhrs, Ubertragung des Wechselfiebers der Pferde auf Schweine. *Berl. tierärztl. Wschr.*, 11, 36, S. 121, 1920.

21. Habersang, Experimentelle Ubertragung der infektiösen Anämie der Pferde auf das Schwein, *Monatsh. für prakt. Tierheilkunde*, 30:3/4, S. 171, 1919.

22. Kutsche, E., Ein Weiterer Beitrag zur Frage der Verwendbarkeit des Schweines als Impftier bei der Festellung der infektiösen Anämie der Pferde, *Monatsh. für prakt. Tierheilkunde*, 30:11/12, S. 557, 1920.

23. Kobe, K., Transmission of infectious anemia to splenectomized piglets, *Arch. wiss prakt. Tierheilk*, 73, pp. 399-408, 1938.

24. Semenov, M. A., and Oldenborger, N. A., Possible infection of pigs by equine infectious anemia, Trud. vsesojuz. Inst. eksp. Vet., 12, pp. 60-66, 1936.

25. Donatien, A., and F. Lestoquard, L'anémie pernicieuse due mouton et de la chèvre. C. R. de l'acad. des Sci., Paris, 178:22, p. 2203, 1924.

26. Stein, C. D., Infectious anemia or swamp fever in horses, *J.A.V.M.A.*, 87:3, pp. 312-324 (Sept.), 1935.

27. Stein, C. D., Osteen, O. L., and Mott, L. O., A resume of studies and observations on infectious anemia or swamp fever in horses carried on by the Bureau of Animal Industry from 1935 to 1940—mimeographed, U.S.D.A.

28. Stein, C. D., Lotze, J. C., and Mott, L. O., Transmission of equine infectious anemia by the stable fly, *Stomaxys calcitrans*, the horsefly, *Tabanus sulcifrons* (Macquart), and by injection of minute amounts of virus, *Am. J. Vet. Res.*, 3, pp. 183-193, 1942.

*V. C., A. U. S.

A Preliminary Report of the Use of Lentin in Atonic Indigestion of Dairy Cattle*

By GLENN C. HOLM†
Moscow, Idaho

ATONY of the fore-stomachs is a common disease in dairy cows on official test and in beef steers being fitted for fat stock shows. Many treatments have been tried with varying results. A rational treatment which has been developed for cows consists of the administration of bland oils, water, tartar emetic, and digestive stimulants, such as ginger and gentian. While the results obtained have been reasonably good, the therapy does not completely restore the level of milk production existing at the time the atony appeared. In seeking improved methods of therapy, the drug lentin was investigated. Lentin is a synthetic drug of recent origin which stimulates the parasympathetic nervous system and smooth muscles in general. It has been used in digestive disturbances to stimulate the flow of digestive juices and the peristaltic activities of the stomach and intestines. Lentin has been used also for uterine inertia in many species.

Burgett and Bardens[1] presented an extensive report on the history and action of lentin in impactions in horses. Keller,[2] Heinrich,[3] Haltenhoff,[4] Kaltenegger,[5] Küst,[6] and Benesch and Steinmetzer[7] reported good results with lentin in dystocias and uterine inertia. They used dosages ranging from 4 to 8mg. Haertle,[8] Haltenhoff[4] Krynedl,[9] Lass,[10] von Almasy,[11] Freude,[12] Pospichal,[13] and Langer[14] reported good results with lentin in digestive disturbances in cattle, swine, dogs, cats, elephants and rabbits. The dosages used by these men for cattle with digestive troubles were as high as those used for pyometras, retained placentae and atony of the uterus. Haertle[8] warned against using lentin in cases suspected as being brought on by traumatic gastritis, but stated that the effects of lentin could be stopped by injecting atropine if excitement became too great. Craige[15] showed in dogs that maximal output of digestive juices and maximal intestinal movement were best obtained with submaximal doses of lentin.

*Published with the approval of the Director as Research Paper No. 231 of the Idaho Agricultural Experiment Station.
†Station Veterinarian, Idaho Agricultural Experiment Station.

Experimental

Twenty cases of atonic indigestion in dairy cattle have been treated with lentin. Doses of various sizes were used, and subcutaneous, intramuscular and intravenous administration employed. The drug was given to open cows and to some as far advanced in pregnancy as seven months.

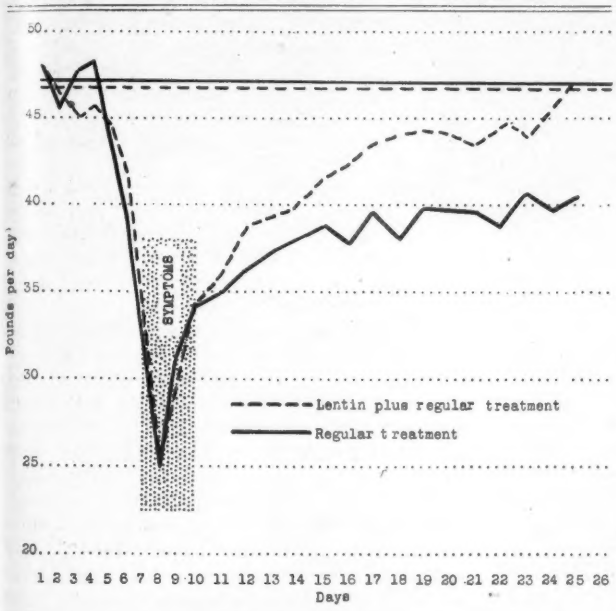
It was found that 1.5mg would give equal if not better results than would 4mg when given to a small Jersey. Two milligrams gave optimum results with large Holsteins. These doses are smaller than the 4 to 8mg doses recommended by European veterinarians, but the findings are consistent with the observations reported by Craige.[15] In general, the intramuscular method of administration appeared to be preferable in that the action was observed more promptly than after subcutaneous administration and was safer than when given by intravenous injection in glucose solution. With the latter method of administration, the animals were apt to show a moderate degree of shock and there existed some danger of arresting heart action. None of the 20 cows died from the disease or from the treatment. Even more important was the fact that none of the pregnant cows aborted, even though some of them were in the seventh month of pregnancy. This finding agreed with the reports of other observers.

Supportive treatments of various types were employed simultaneously with and following lentin therapy. If the animal was toxic and extremely dehydrated, the best results were obtained by giving large amounts of water, one ounce of sodium thiosulphate, 90 grains of tartar emetic and one ounce each of ginger and gentian. In the average case only tartar emetic, ginger and gentian seemed to be beneficial as an adjunct to lentin.

In order to evaluate the possible usefulness of lentin, a comparison was made of the progress of two groups, of eight cows each, suffering from atonic indigestion. The groups were as equally matched as possible with regard to the severity of the condition. In some instances it was necessary to withhold the lentin treatment for 24 hours in order to ob-

tain comparable cases. All other animals were treated within 12 hours following the onset of symptoms. Usually milk production continued to drop for one milking in the lentin-treated group and for two or more milkings in the control group. All the animals were carefully examined to insure freedom from any complicating ailment which might interfere with milk production, since the latter was used as the criterion for evaluating treatment. The animals in both groups were back on feed, usually, within two days. The progress of recovery as represented by improvement in milk production is shown in Chart I. It is apparent that the animals which received lentin recovered more promptly than the control group. Even more important is the fact that the lentin-treated cows returned to the milk production level existing at the time the atonic indigestion developed, while the cows receiving the routine treatment never equaled their previous milk flow. Some sudden decreases in milk production as shown in the graph could be attributed to estrus.

TABLE I—PROGRESS OF RECOVERY INDICATED BY IMPROVED MILK SUPPLY



The cows manifested characteristic clinical symptoms of the condition, when milk production had fallen to 70 to 80% of normal. The longer the animal went untreated, the greater was the time required for recovery. Subsequent experience demonstrated that withholding treatment for 24 hours after symptoms had developed delayed recovery by about seven days. This notable difference in the rate of recovery impressed upon the herdsman the necessity of reporting all cases at an early date.

The twelve additional cows receiving lentin made rapid and uneventful recoveries. Two animals in this group had mastitis and their milk production could not be used as a criterion of recovery. However, they were back on feed within two days. The remaining 10 animals had an average production of 44.21 pounds per day, one week before symptoms appeared. Their low average production was 35.4 pounds and they returned to an average of 45.73 pounds in 4.6 days from the time they were treated.

Grain rations were taken from all animals so soon as symptoms of atonic indigestion appeared. They had free access to alfalfa hay and were given small amounts of silage. As soon as they began eating all their silage they were given about one pound of bran. If they continued to recover, the grain ration was gradually changed and brought back to the original quantity and quality. Molasses was fed only when recovery was slow — only one cow in the lentin-treated group needing it.

Altogether 20 cows have been treated with lentin and the results have been highly satisfactory. The results were spectacular, especially in severe and neglected cases, because the animals began to show glandular activity and rumen movements soon after injection. Salivation was usually seen within 15 minutes. Bowel movements sometimes followed shortly thereafter.

Summary

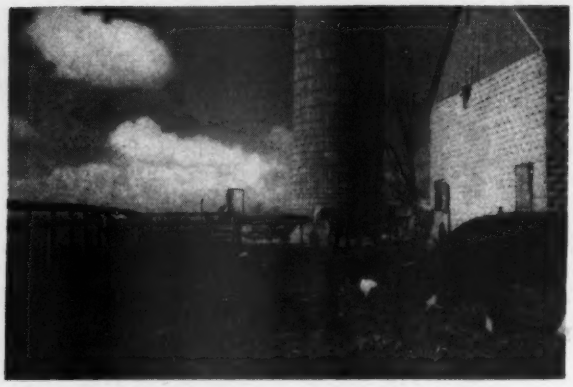
A study has been made of the use of lentin in the treatment of atonic indigestion in dairy cows. A comparison of eight cases with the same number of controls of comparable severity receiving the routine treatment alone, showed that the lentin-treated animals recovered more satisfactorily. Milk production was restored more promptly and more completely than with the routine therapy.

Doses of 1.5 to 2mg were found satisfactory when supported by tartar emetic, gentian, ginger and mineral oil and, in dehydrated cases, water. The intramuscular method of administration was preferred. Prompt response was obtained. Therapy was indicated as soon as the condition was recognized. A delay of 24 hours in treatment delayed re-

covery by about seven days. This preliminary report covers experiences with 20 cases.

References

1. Burgett, M. V. and Bardens, G. W., Treatment of impaction in the horse with lentin, the new rapid-acting cathartic, *J. A. V. M. A.* 90, pp. 646-655 (May), 1937.
2. Keller, E., Beitrag zur Anwendung des Lentin-Merck als Uterinum bei Rind und Schwein, *Deutsch. Tierärztl. Wchnschr.* 42, pp. 393-394 (June 23), 1934.
3. Heinrich, K., Lentin in der geburtshilflichen Rinder- und Schweine-praxis, *Osterreich. Tierarzt* 10, pp. 41-42 (March 3), 1937.
4. Haltenhoff, R., Erfahrungen mit Lentin "Merck" in der Praxis bei Pferden, Rindern, Schweinen, Ziegen und Hunden, Berlin. *Tierärztl. Wchnschr.* 50:2, p. 17, 1934.
5. Kaltenegger, A., Lentin extradural als Uterinum beim Rind. Wien, *Tierärztl. Monatsschr.* 23:14, pp 429-430, 1936.
6. Küst, Zur Behandlung der Pyometra des Rindes, *Deutsch. Tierärztl. Wchnschr.* 42, pp. 749-752 (Nov. 24), 1934.
7. Benesch, F. and Steinmetzer, K., Uber die Registrierung der Uteruskontraktionen beim lebenden Rind nach Lentinwirkung, *Wien. Tierärztl. Monatsschr.* 23, pp. 225-231 (April 15), 1936.
8. Haertle, E., Lentin bei Indigestion und Verstopfung der Schweine und Rinder, *Tierärztl. Rund.* 38, pp. 246-248 (April 10), 1932.
9. Krynedl, F., Zur Behandlung der Verdauungsstörungen der Haustiere, *Osterreich. Tierarzt.* Folge 1, 1933.
10. Lass, E. W., Die Wirkung des Lentins auf die motorische Tätigkeit der Vormägen gesunder und kranker Rinder, Dissertation, Leipzig, 1933 (abstr. Berlin. *Tierärztl. Wchnschr.* 50, No. 2, 1934).
11. von Almasy, H. C. N., Meteorismus beim Sumpfbiber, *Tierärztl. Rund.* 39, p. 185 (March 13), 1933.
12. Freude, A., Lentin-Merck, Berlin. *Tierärztl. Wchnschr.* 43, p. 694 (Oct. 21), 1932.
13. Pospichal, R., Lentin-Merck bei hunden und Katzen, Wien. *Tierärztl. Monatsschr.* 21:21, pp. 657-659, 1934.
14. Langer, H., Verstopfung und Harnverhaltung beim Elefanten, Wien. *Tierärztl. Monatsschr.* 21:23, 1934.
15. Craige, A. H., The relationship between salivary output and intestinal effects with carbaminoylcholine chloride (Lentin), *J. A. V. M. A.*, 95, pp. 701-709 (Dec.), 1939.



★ ★ ★ ★

Unpleasant as it may be to point it out, animal production in the United States has been only superficially successful, and from some points of view, a colossal failure from the very first. It has grown vast in the midst of great natural resources, but the producers most of the time have hovered on the margin of bankruptcy and, since the days of George Washington, have experienced cycles of utter impoverishment. No nation less fortunately endowed by nature could have survived the staggering losses from animal disease that the American people, unaware and uninformed, have written into their balance sheets year after year. — *Veterinary Military History.*

★ ★ ★ ★

Special Formulae

With the modern and complete supply house equipped to make up any formulae desired, the "making of medicine" is thereby avoided to a certain degree. Years ago, the practitioner was compelled to manufacture his own blisters, lotions, powders, boluses and ointments.

Another thing, the longer one practices, the fewer kinds of mixtures he uses. For example, a good colic medicine can also be used for bloat, impaction, acute indigestion, scours, and many other digestive troubles. Camphor, creosote and guaiacol solutions can take care of nearly all the pulmonary ailments. One kind of liniment, blister, ointment, several powders and various capsules will take care of the balance of common maladies and injuries. Gluconate and dextrose take the place of many other agents.

In summer, a wide-mouthed vial filled with cotton and covered with water is placed with our gelatine capsules, both empty and filled. It tends to keep them from cracking.

Biologics are kept in the cellar and, as we use them, we keep track on the ones getting "low" and replace them.

As I look back over the last thirty years, I am amazed at the progress in our profession, particularly in the way of adequate and excellent supplies.—*E. T. Baker.*

★ ★ ★ ★

★ ★ ★ BUY WAR BONDS ★ ★ ★
AND HOLD THEM

Phemerol in the Treatment of 176 Cows with Chronic Streptococcic Mastitis*

By C. S. BRYAN,† L. P. HEDEMAN,†
E. E. VISGER** and J. W. CUNKELMAN†
East Lansing, Michigan

THE treatment of chronic streptococcic mastitis by udder infusion is established as a rational therapeutic procedure. A number of preparations have been shown to yield approximately 90% of recoveries when infected cattle, with no marked induration of the udder, were treated.[1,5,6,7,8,9,10] The search continues for new products that will yield, at a reasonable cost, the highest percentage of recoveries with the fewest treatments without intolerable damage to the udder. The relatively low cost of phemerol†† and the favorable results obtained by its use in human infections and in laboratory experiments with the mastitis streptococci suggested this study.

Phemerol

The phemerol used was a 1 to 1000 aqueous solution of para - tertiary - octyl - phenoxy - ethoxy - ethyl - dimethyl - benzyl - ammonium chloride monohydrate. It is used in human medicine as a germicide for topical application to the skin and accessible mucous membranes and for irrigation of the body cavities. Unless otherwise stated in the following discussion, the preparation of phemerol used was the 1 to 1000 aqueous solution.

The Effect of Phemerol on the Mastitis Streptococci in Vitro

Laboratory studies were conducted to determine the concentration of phemerol necessary to kill the mastitis streptococci. This was done by dilution of the 1 to 1000 commercial preparation with sterile water. A 1 to 80,000 final dilution of phemerol killed the organisms after a 10 minute exposure but they were not killed on shorter contact. Dilutions up to 1 to 70,000 were effective within one minute.

When 10% of organic matter, in the form of skim milk, was added, a final dilution of 1 to 10,000 of phemerol killed on contact for more than 10 minutes, while solutions up to 1 to 9,000 required less than one minute to kill the mastitis streptococci. These results indicate the germicidal action of phemerol toward these streptococci.

Irritating Properties of Phemerol

In all udder infusion it is highly desirable that the drugs used do not possess marked, irritating properties to the udder tissue. This is especially important in treating lactating cows, as irritation of the mammary tissue results in the secretion of abnormal milk and a lowered production for varying periods following treatment.

To determine the reaction of the udder to phemerol the right rear, right front, left front and left rear quarters of two cows with healthy udders were simultaneously infused with phemerol to the amount of 10, 25, 50 and 75cc respectively. The right rear, right front, and left front quarters of both cows and the left rear quarter of one cow became slightly swollen and gave milk containing flakes for a period of five days, while the left rear quarter of the other cow became swollen and resulted in the production of "garget" for one day and flakes for an additional 10 days.

After the udders of these two cows returned to normal they were again infused with phemerol. This time the right rear, right front, left front, and left rear quarters of one cow were infused with 50, 75, 100 and 125cc respectively, and of the other cow with 150, 175, 200 and 225cc respectively. All quarters became slightly swollen, and produced "flaky" milk for five days. The production was reduced 30% and returned to normal within 14 days. The quantity of phemerol infused did not seem to influence the udder reaction. The major clinical changes, in the treated cows, were a thickening of the mucous membrane lining the teat and milk cisterns and the production of abnormal milk. The mucous membrane thickening was due to inflammatory swelling and must not be interpreted as induration. Such effects are similar to reactions observed upon the injection of most agents into the udder.

*Journal article 717 (n. s.) from Michigan Agricultural Experiment Station.
†Department of Surgery and Medicine, Michigan State College.
**Department of Anatomy, Michigan State College.
††The Phemerol solution was furnished through the courtesy of Parke, Davis and Co., Detroit 32, Mich.

Dosage of Phemerol

Three disease-free cows were infected with the mastitis streptococci by injecting 5cc of broth culture into each quarter. Thus the four quarters of cow No. 1 were infected with *Streptococcus agalactiae*, of cow No. 2 with *Streptococcus dysgalactiae* and of cow No. 3 with *Streptococcus uberis*. Repeated bacteriological examinations demonstrated that infection had occurred.

The right rear, right front, left front, and left rear quarters of each cow were infused with 10, 25, 50 and 75cc of phemerol, respectively. The right rear quarter of each cow became slightly swollen and there were flakes in the milk for two days. The infection remained. The 10cc dose was repeated five times at weekly intervals but the right rear quarter of each cow remained infected. Following the sixth 10cc infusion, 75cc was infused into each quarter and both became free of the infection without any greater irritation than had ensued from the 10cc dose. The remaining three quarters of each cow recovered from the infection from the first infusions (of 25, 50 and 75cc). Each quarter became slightly swollen and produced some flakes in the milk for four days.

Two cows suffering from chronic streptococcic mastitis, as a result of natural infection —having no marked udder induration—were treated with 75cc of phemerol per quarter. The usual reaction was noted and both recovered from the infection. A third cow in the same condition was similarly treated but only two quarters became free from the infection with one treatment, while the other two quarters remained infected despite four repeated treatments applied at four day intervals. The dosage was then increased to 200cc in one quarter and 300cc in the other, but the cow remained infected. Infection persisted in spite of three additional infusions of 300cc per quarter.

A therapeutic dose of 75cc of phemerol was chosen as the one to use for subsequent experiments. This was always administered to all four quarters of a cow since previous work had demonstrated the desirability of such a procedure.[5]

Selection of Suitable Subjects for Treatment

The fact of streptococcus infection of the udder was established by the microscopic test[2,3], that is, streptococci were found upon microscopic examination of properly collected milk samples after a minimum of 12 hours of incubation at 37° C. A similar examination was again made, as soon as the milk assumed a normal physical appearance after treatment, to determine the bacteriological status of the udder of each cow.

To determine whether infected cows having a marked amount of indurated tissue in the udder would respond to this treatment, five such cows were treated by infusing each quarter with 75cc of phemerol. None of these cows became free from the streptococcic mastitis despite six infusions. For comparison five cows with no detectable indurations were treated similarly. Three of these responded with one treatment, while the other two required two treatments.

The cases treated in the subsequent work were cows detected as being infected by the microscopic test and found to be free from marked indurative changes of the udder as determined by a careful physical examination. "Marked induration" was interpreted to mean that definite areas of fibrosis, either single or multiple, one or more inches in diameter were present in one or more quarters.

It is recommended that an infected cow be treated near the end of the lactation period whenever this is possible

The Results of Treating 176 Cows

One hundred and sixty cows with chronic streptococcic mastitis, having no marked induration of their udders, were treated by infusing each quarter with 75cc of phemerol. Recoveries were obtained in 90 of these cows with one treatment, in 40 with two treatments and in 17 cows with three treatments. Thirteen cows that had been selected as suitable subjects for treatment, according to the methods outlined, were repeatedly treated but failed to become free from the streptococcus infection of the udder. Therefore, of the 160 cases described here plus the 11 cases mentioned in the preliminary work, making a total of 171 cows, 147 or 86% were freed from the chronic streptococcic mastitis infection. The five additional cows having marked induration of the udder, which were treated but did not recover, are not included in these data. They were not considered suitable subjects for the treatment.

The irritating effects of phemerol on the udder are indicated by the influence of udder infusion upon the milk production and the physical character of milk produced by the infused quarter. Observations were made on 30 cows; 10 at the beginning of the lactation period, 10 at approximately the middle, and 10 near the end of lactation. The greatest drop in milk production resulted in those cows at the start of the lactation since, immediately following treatment, five produced 85% less milk and five produced 50% less milk. In all cases, except two, the milk production returned to normal within two weeks. The 20 cows treated near the middle or the latter end of lactation experienced a drop of 50% or less in milk production. Some cows exhibit a hypersensitivity to phemerol udder infusion, as determined by excessive reaction at the time of treatment, or marked drop in milk flow, or both. To date there is no way of knowing, prior to treatment, how any cow will react. It is recommended, therefore that infected cows be treated near the end of lactation period, whenever this is possible and fits into the infectious mastitis control program of the herd.

The Effect of Phemerol Treatment Upon the Bacteriological Quality of the Milk

The quality of the milk, as measured by the standard plate count, is greatly reduced after udder infection as compared to the bacteriological quality of the milk produced prior to infection.[4] Naturally it was desirable to determine whether the recovery of the cow from chronic streptococcic mastitis results in an improvement of the quality of milk produced. Such observations were made in 25 cows.

The percentage reduction of bacteria count of milk, after treatment and recovery, varied from 20 to 99% in the different cows. This is a substantial return of milk quality to normal after recovery has been effected through treatment with phemerol.

Cases with Undesirable Effects

Cow No. 1.—A68328, Guernsey, three-year-old showing slight induration in right rear quarter. Milk normal in appearance. Found positive for streptococcic mastitis on microscopic test. Cow had been fresh for three months when treated with phemerol. Owner stated that two days after treatment udder became very hot, swollen and painful and he obtained nothing but what appeared to be blood on milking. Eleven days after treatment the udder was somewhat swollen. Samples from quarters showed R. R. garget, L. F. blood serum, R. F. watery milk, L. R. blood serum and garget. A composite sample of the above was negative to streptococcus. This cow was sent to slaughter.

Cow No. 2.—V519795, Guernsey, seven years of age. Leaky left front teat due to traumatic injury a year previously. Moderate induration in L. F. and L. R. Cow treated with phemerol. Owner stated that on the third day after treatment bloody milk was given from the L. F. and there was much swelling and inflammation in R. F., L. R., and R. R. and flakes in the milk from these quarters. This condition persisted for five days. Seventeen days after treatment, milk production was up to about two-thirds of normal. A milk sample was negative to streptococcus but there was a mass in each rear quarter about the size of a large orange. These masses definitely contained some fibrosis. This cow had been fresh only one-and-one-half months when treated.

Cows Nos. 3 and 4.—585328 and 34A1053, Holstein, six years and four years of age, respectively. Physical examination showed udders to be normal. Positive for streptococcus on microscopic test. Treated with phemerol. Milk samples were taken 20 days after treatment and found to be negative to streptococcic mastitis. The owner stated that the milk had contained flakes two days after treatment which had continued off and on for 10 days. At the time milk samples were taken (20 days after treatment) the milk appeared normal from both cows and their production was about two-thirds of normal, but both cows had hard swellings, of about the size of a lemon, in the R. R. quarters and moderate induration in the other quarters. The swellings in the R. R. quarters have since decreased in size but they are still sufficiently large to be classed as marked induration. These cows had been fresh for about two months when treated.

Cow No. 5.—Guernsey, five years of age; had had two normal previous lactations; freshened May 2, 1943, with a caked udder. The owner observed blood in the milk from the right rear quarter of this cow. Physical examination of the udder on June 21, 1943, revealed a symmetrical udder but on deep palpation a slight induration was noted in the right rear quarter. The milk produced was normal on strip cup examination. Streptococcic mastitis was diagnosed by microscopic test.

July 1, 75cc of phemerol was infused into each quarter. Slight swelling of the udder was observed and bloody milk was obtained from the front quarters for a period of four days and from the rear quarters for two weeks.

Physical examination on July 29 revealed marked induration of the right rear quarter and slight induration of the left rear quarter. A composite milk sample revealed streptococci.

Because of the marked reaction following

treatment and failure to recover no further infusions were made.

Cow No. 6.—A seven-year-old, Guernsey, recently added to the herd by purchase, freshened on Feb. 26, 1943, and repeatedly gave "gargety" milk. Physical examination June 21 revealed atrophy of the rear quarters which was pronounced in the right rear quarter. Marked induration was noted in the right rear and slight induration in both left quarters. "Gargety" milk was obtained from the right rear quarter. Microscopic test of milk sample revealed streptococcic mastitis.

The owner was advised that this cow was *not* a suitable subject for treatment and if treated it was unlikely that she would become free from the infection. Because of the high value of the cow (if cured) the owner insisted that she be treated; therefore, 75cc of phemerol were infused into each quarter on July 1, 1943.

The milk from all four quarters became bloody and so persisted for one week, after which the color became normal but flakes were present continuously until the examination July 29 at which time marked induration was noted in both rear quarters. In view of these changes, and the persistent drop in production to practically no milk, and the continuance of infection as revealed by the microscopic test the owner decided to sell the cow for slaughter.

Thus of 176 cows treated, the condition of six (3.4%) definitely deteriorated from treatment. It will be noted, however, that of the six cases in which the results of treatment were undesirable that one (Cow No. 6) ordinarily would not have been treated and the other five all were in the first quarter of the lactation period. This emphasizes what has been stated in the literature repeatedly, *viz.* that the prognosis is more favorable in cases treated late in the lactation period or during the "dry" period than it is in recently freshened cows and untoward sequels are far less likely to develop in the former groups. It also again stresses the importance of accurate diagnosis and careful selection of cases for udder infusion to the success of any program for mastitis control. Mastitis control is the most profitable service the veterinary profession can render the dairy industry but halfway measures are of little value. Udder infusion is a valuable therapeutic measure in mastitis control but the results will inevitably be disappointing if cases unsuitable for infusion are not rigidly excluded. These unsuitable cases include *all* in which there is marked induration of udder tissue and, one could almost say, all animals in the first two months of the lactation period.

Summary

One hundred seventy-one cows with chronic streptococcic mastitis having no marked induration of their udders, were treated by infusing each quarter with 75cc of 1 to 1000 aqueous solution of phemerol. Of these, 147 or 86% were freed of the infection. In most cows a transitory thickening (edema) of the mucous lining of the teat and milk cisterns resulted and abnormal milk was produced for varying periods after treatment.

Five cows with marked induration of their udders were similarly treated but failed to recover. These were unsuitable subjects for treatment but were infused to ascertain the degree of irritation produced in such cases by phemerol.

The greatest decrease in milk flow, as a result of the infusion, occurred in cows in the early stages of lactation. It is recommended that cows be treated near the end of lactation, so that microscopic examinations will demonstrate recovery or the failure of the treatment before the onset of the dry period.

The standard plate bacteria count of milk produced by 25 cows before treatment and upon recovery after treatment yielded reductions in bacteria count varying from 20 to 99%.

LITERATURE CITED

1. Bean, C. W., *et al.* Chemotherapy of streptococcal bovine mastitis. *Am. J. Vet. Res.*, 4:13, pp. 344-352, 1943.
2. Bryan, C. S. The microscopic diagnosis of infectious mastitis. *Vet. Med.*, 30:4, pp. 149-156, 1935.
3. *Ibid.* Michigan Agr. Exp Sta. Bul. 186, 1943.
4. Bryan C. S. and G. M. Trout. The influence of streptococcic infection of the udder on the flavor, chloride content, and bacteriological quality of the milk produced. *J. Dairy Sci.*, 18:12, pp. 777-792, 1935.
5. Bryan, C. S., *et al.* The results obtained with tyrothricin in the treatment of 157 cows with streptococcic mastitis. *Vet. Med.*, 37:9, pp. 364-369, 1942.
6. Klein, L. A., *et al.* Effect of novoxil liquid on catarrhal (chronic) mastitis and on *Streptococcus agalactiae* udder infection. *Am. J. Vet. Res.*, 2:3, pp. 141-145, 1941.
7. Little, R. B., *et al.* The use of gramacidin and other agents for the elimination of the chronic form of bovine mastitis. *Am. J. Vet. Res.*, 2:4, pp. 305-312, 1941.
8. Martin, F. E. The eradication of streptococcic mastitis by treatment with tyrothricin. *J. A. V. M. A.*, 101, pp. 23-25, 1942.
9. Palmer, C. C. Homogenized sulfanilamide-in-oil in the treatment of bovine mastitis. *N. Am. Vet.*, 23, pp. 776-779, 1942.
10. Tripp, L. H. and C. A. Lawrence. Clinical observations on use of gramicidin in the treatment of bovine mastitis. *Cor. Vet.*, 32:1, pp. 90-95, 1942.

★ ★ ★ BUY WAR BONDS ★ ★ ★
AND HOLD THEM

Influence of B Vitamins, Liver and Yeast on Induced Necrotic Enteritis in Swine

R. A. RASMUSSEN[3], H. J. STAFSETH[2], V. A. FREEMAN[1], and MARIAN J. MILLER[3]
East Lansing, Michigan

Davis, *et al.*, 1940, 1943, have indicated that differing nutritional regimens alter the course of necrotic enteritis in swine. Nicotinic acid was found to decrease the severity of the disease (Davis, *et al.*, 1940) and its chief action is in the period following the initial attack by promoting increased rate of gain (Davis, *et al.*, 1943). These workers found thiamine and pyridoxine ineffective under the experimental conditions.

This paper reports further work conducted between November, 1942, and February, 1944, on the nutritional aspects of necrotic enteritis in swine induced by feeding cultures of *Salmonella choleraesuis*.

Experimental

Three trials (winter 1942, summer 1943, and winter 1943) were conducted using a total of 113 pigs (9 to 12 weeks of age at the beginning) grouped into 17 lots according to litter, sex and weight. Lots 1 to 6 had six animals per lot and all other lots had seven animals each. The animals were kept in a barn with concrete floors and had constant access to fresh water.

TABLE I—BASAL RATIONS FOR SWINE

Feed	Lots 1-4 an 7-19 per cent	Lot 5 per cent	Lot 6 per cent
Ground yellow corn	75.7	73.7	73.7
Soybean oil meal	7.8	10.8	7.8
Tankage	10.0	7.0	7.0
Alfalfa meal	5.0	5.0	5.0
Minerals[1]	1.5	1.5	1.5
Liver (dry basis)		2.0	
Brewer's yeast			5.0
Delsterol	3500[2]	3500[2]	3500[2]

[1] Bonemeal 32.3, ground limestone 32.3, fine salt 32.3, copperas 2.5, $CuSO_4.5H_2O$ 0.2, $MnSO_4.2H_2O$ 0.1, ZnO 0.1, cobaltous acetate 0.1, and KI 0.1; all given in percentages.
[2] Units of vitamin D per 100 lbs. live weight weekly.

The basal rations fed are listed in Table I and the supplements in Table II.

The animals were slop fed, twice daily. The dry basal ration was made to a gruel at feeding time, the liver and other supplements added and, after thorough mixing, offered to the pigs. The gruel was made with buttermilk (one pound dry feed to two pounds buttermilk) for lots 1 through 6 (Trial 1), and with water for the other lots.

The animals were weighed as individuals and as lots at weekly intervals.

The culture (to enhance virulence) for Trial 1 was injected intraperitoneally into a young pig and recovered eight days later. This recovered culture was used to prepare the broth culture for feeding. The culture for Trial 2 was similarly prepared. The culture for Trial 3 was first injected into one animal and then fed to another before the broth culture was prepared.

Results and Discussion

All animals made normal weight gains during the preliminary period and no visible evidence of nutritional deficiency developed. Each hog exhibited a definite rise in rectal temperature from 12 to 48 hours after administration of the culture. After the initial rise the rectal temperature either remained high or fluctuated between high and subnormal for seven to 12 days in severe attacks. Diarrhea always occurred during this period, but usually abated by the end of 10 days.

The first trial (winter 1942, lots 1-6) was conducted primarily to determine the most effective level of nicotinic acid in alleviating the disease produced by feeding *S. choleraesuis*. Six lots of six hogs each were used in the trial. Levels of 15, 100 and 300mg (lots 2, 3, 4) of nicotinic acid per 100 pounds live weight daily were fed in comparison to a control lot (1) receiving no nicotinic acid. In order to check the possible benefit of factors other than nicotinic acid, 2% (dry basis) of fresh liver (lot 5), and 5% of brewer's yeast (lot 6) in the basal ration were superimposed on 100mg of nicotinic acid per 100 pounds live weight daily.

Two pigs of lot 1, two pigs of lot 2, one pig of lot 3 and two pigs of lot 6 died of acute enteritis between the third and fourth day. The organism was reisolated from various tissues in each case.

The weights of the animals for the five weeks before and the first week after feeding the culture, the 10-week experimental period (Table IV) and the final four weeks, starting one week after the culture was fed (Table IV), were treated for analysis of variance using Fisher's Argument *t*. All lots were reduced to four animals by random elimination. No significant differences were evident at either the 1 or 5% levels for the preliminary feeding period or for the first week after feeding *S. choleraesuis*.

[1] Section of Animal Husbandry, Michigan Agr. Exp. Sta.
[2] Section of Bacteriology, Michigan Agr. Exp. Sta.
[3] Section of Chemistry, Michigan Agr. Exp. Sta.
*Published with permission of the director of the Experiment Station as Journal Article 701 (n.s.).

As no significant differences were found in weight gains between the various lots during the preliminary period and the first week after the culture was given, the significant differences at the 1% level for lots 4 and 5 over the controls for the entire experimental period are probably due to the supplements fed. The responses of all lots over the control lot (significant at the 5% level) during the recovery phase of the disease are probably due to the supplemental feeding. The high

so that other factors could be superimposed and studied in the presence of a nutritionally high level of this factor.

A mild reaction to the culture was encountered in Trial 2 (lots 7-12), and a severe reaction resulting in high death losses was encountered in Trial 3 (lots 14-19). While little can be gleaned from these two trials in regard to nutritional responses to *S. choleraesuis* infection, certain interesting features can be brought out.

TABLE II—SUPPLEMENTS FED IN SWINE RATIONS (PER 100 LBS. LIVE WEIGHT DAILY)

Lot No.*	2	3	4	5	6	9	10	11&16	12	14	15	17	18	19
Nicotinic acid.....mg.	15	100	300	100	100	100	100	100	500	30	30	100	100	100
Thiamine-HCl .....mg.								10						
Riboflavin .....mg.								10						
Pyridoxine .....mg.								10				10		
Calcium pantothenate..mg.								20				20		
P-aminobenzoic acid....mg.								10				10	10	10
Choline chloride..... g.								2				2	2	
Liver (fresh)..... g.											300			
Liver (H_2O ext.)..... g.						4								
Liver (alc. insol. H_2O ext.) ..... g.							3							

*Lots 1 and 7 are control lots receiving no supplement. Lots 1 through 6 winter 1942, lots 7 through 12 summer 1943, and lots 14 through 19 winter 1943.

significance found with lots 4 and 5 (1% level) over the controls (lot 1) indicate that 300mg of nicotinic acid and 100mg of nicotinic acid plus liver are the more effective supplements. From survival data and weight gains, 100mg of nicotinic acid is not as effective as 100mg of nicotinic acid plus liver. Yeast and liver rations in the amounts fed would have raised the nicotinic acid intake to only 150 to 200mg per 100 pounds live weight daily, according to the nicotinic acid content of these products as published by Hale, *et al.* (1942). It therefore seems likely that some principle or principles in addition to nicotinic acid, which aids the hog in recovery from *S. choleraesuis* infection, is present in liver. The beneficial effects of nicotinic acid during the recovery phase are in agreement with the findings of Davis, *et al.* (1943).

The basal ration contained sufficient nicotinic acid (Hale, *et al.*), in view of the findings of Hughes (1943), indicating that the minimum daily requirement of nicotinic acid for young growing swine, lies between 5 and 10mg per 100 pounds live weight.

The very high level of nicotinic acid required for maximum response may be partially due to increased requirement because of disease, but the excessive amounts required indicate that nicotinic acid plays some additional role. However, Davis, *et al.* (1943) conclude that nicotinic acid does not act as a bacteriostatic or bactericidal agent.

In accord with the findings of the first feeding trial, 100mg of nicotinic acid per 100 pounds live weight were fed daily to lots 9, 10, 11, 16, 17, and 19 as an intermediate level

Lots 7 through 12 showed definite reaction to the drenching with *S. choleraesuis* by increased rectal temperatures, but the reaction lasted for only about four days and weight losses were small in contrast to those of the other trials. No death losses occurred. Over the entire period, however, lots 9, 10, 11 and 12 made greater gains than the control lot (7). Lots 10 and 12 gained 20 pounds more than the control lot over the eight weeks period and lot 11 gained 50 pounds more than the control lot. Thus, it appears that a positive response was secured from the alcohol insoluble fraction of the water extract of liver (lot 10) and from 500mg of nicotinic acid per 100 pounds live weight daily (lot 12). The greatest response was secured from the composite of B-vitamins (lot 11).

Because of poor reaction to the culture and the greater weight response secured from the composite of B-vitamins, the third trial (lots 14-19) was conducted to study various members of the B-complex alone and in combination, and to study the reaction of greater dosage of a broth culture of *S. choleraesuis*. After a 5-week preliminary period, the hogs were fed 1ml of broth culture per pound body weight. All hogs had high rectal temperatures within 48 hours. The first animal died on the fifth day after the culture was fed and by the ninth day 25 of the 42 animals were dead. Three animals of lot 14, four animals of lot 15, five animals of lot 16, three animals of lot 17, all seven animals of lot 18 and three animals of lot 19 died. Thus 59% of the animals succumbed in the initial attack of the disease. The death losses were not correlated

with treatment, unless it is assumed that the vitamin supplements and liver were more beneficial to the bacteria than to the experimental animals. This would not be in accord with Trial 1 or the findings of Davis, *et al.* (1940, 1943). This third trial indicates that regardless of the nutritional regimen, hogs

TABLE III—SCHEDULE OF *S. CHOLERAESUIS* CULTURE ADMINISTRATION

Lot No's	Amount given	How given	Age of culture
1-6	40 ml. per pig	mixed in feed	24 hr.
7-12	to 40 lbs., 30 ml. 40-55 lbs., 40 ml. 55 lbs., 50 ml.	drench	24 hr.
14-19	1 ml. per lb.body wt.	mixed in feed	48 hr.

will die of a necrotic type of enteritis caused by feeding large doses of *S. choleraesuis*.

All the lots in this third trial made somewhat better weight gains than the control lot (14), which received 30mg of nicotinic acid per 100 pounds live weight daily, during the preliminary period of 34 days. Lots 15, 16, 17, 18 and 19 gained 35, 29, 14, 3 and 23 pounds, respectively, more than the control lot. This is in accord with the findings of others that certain members of the B-vitamins, known or unknown, enhance the growth promoting value of supposedly adequate rations (Fairbanks, *et al.*, 1944, Miller, *et al.*, 1943, Rasmussen, *et al.*, 1942, Hogan and McRoberts, 1940).

TABLE IV—DIFFERENCE BETWEEN THE MEANS TO BE SIGNIFICANT AT THE FIVE AND ONE PER CENT LEVELS

Lot No.	Entire Period		Final Period	
	Actual dif. between means	Dif. between means for significance	Actual dif. between means	Dif. between means for significance
2	16.0	5% level 23.8	14.3	5% level 11.2
3	15.7	1% level 32.9	12.0	1% level 15.5
4	35.2		20.8	
5	36.5		19.0	
6	17.8		11.3	

The gain per animal in the animals that survived was greater in lots 15 and 16 than in the control lot; however, the surviving animals were too few for adequate comparison.

It is of interest to note that drenching with *S. choleraesuis* apparently is not as harmful as mixing the culture in the feed. When the culture was fed (Trials 1 and 3) deaths resulted which was not the case when the culture was given as a drench (Trial 2). This is further indicated in a lot of hogs carried through on ration 14 but not considered herein. A culture recovered from one of the hogs of lot 18 was given by stomach tube to this lot of 8 hogs at the rate of 1ml of a 48-hour broth culture per pound of body weight. None of the animals died and the duration of the infection was short. The reason cannot be explained at this time. It is possible that the slop protects the organism against the bacterial effect of the hydrochloric acid in the stomach.

Summary

Necrotic enteritis of hogs was produced by administering *S. choleraesuis*. A more severe reaction was secured when the culture was mixed in the feed than when given as a drench. Difference in virulence of the culture could have been responsible for the difference in reaction, but this seems unlikely.

Many hogs died from the initial attack of the disease regardless of the nutritional regimen but, during the recovery period, nicotinic acid and some principle or principles present in liver, but not in sufficient quantities in yeast, are of benefit by promoting increased weight gains and decreasing the length of the recovery period.

A composite of known B-vitamins may give a better response than nicotinic acid alone in the recovery phase of the disease.

Acknowledgment

We are indebted to Anheuser-Busch, Inc., St. Louis, Missouri, for the dried brewer's yeast, and to Lederle Laboratories, Inc., Pearl River, New York, for the liver fraction and choline used in these studies.

We are grateful to Mr. E. L. F. Stockstad of Lederle Laboratories, Inc., for checking the content of some of the feeds for the *Lactobacillus casei* factor and to Dr. T. H. Jukes of Lederle Laboratories for helpful suggestions.

Literature Cited

1. Davis, George K., Freeman, V. A. and Madsen, L. L. The relation of nutrition to the development of necrotic enteritis in swine. Michigan Agr. Exp. Sta. Tech. Bul. 170, 1940.

2. Davis, George K., and Freeman, V. A. Studies upon the relation of nutrition to the development of necrotic enteritis in swine. Am. Soc. Animal Prod., Proc. pp. 316-323, 1940.

3. Davis, George K., Hale, E. B. and Freeman, V. A. Response of pigs given large doses of *Salmonella choleraesuis* to sulfaguanidine, nicotinic acid, thiamine and pyridoxine. *J. Animal Sci.*, 2, pp. 138-145, 1943.

4. Fairbanks, B. W., Krider, J. L. and Carroll, W. E. Distillers' by-products in swine rations. *J. Animal Sci.*, 3, pp. 29-40, 1944.

5. Hale, E. B., Davis, G. K. and Baldwin, H. R. The distribution of nicotinic acid in feeds. *J. Biol. Chem.*, 146, pp. 565-570, 1942.

6. Hogan, A. G. and McRoberts, V. F. Vitamin deficiencies in a ration for brood sows. *Am. Soc. Animal Prod.*, Proc., pp. 139-143, 1940.

7. Hughes, E. H. The minimum requirement of nicotinic acid for the growing pig. *J. Animal Sci.*, 2, pp. 23-26, 1943.

8. Miller, R. C., Keith, T. B., Thorp, W. T. S. and McCarty, M. A. Nutritive requirements of young pigs. Pennsylvania Agr. Exp. Sta. Bul. 449, 1943.

9. Rasmussen, Russel A., Smith, Harry H., Phillips, Ralph W. and Cunha, Tony J. Nutritional inadequacy of beet molasses rations for swine. Utah Agr. Exp. Sta. Bul. 302, 1943.

Autobiography of a Veterinary Practitioner

By E. T. BAKER, Moscow, Idaho

XXVI

Our Profession

AS THE last of this series of memories, sage observations and nothing much in particular is written, I want to thank the writers of many kind letters. They have evinced their interest and appreciation in such a manner that I feel amply repaid for the effort expended in jotting them down.

In my short span of a little over half a century, I have seen the rise of our profession to its present status. Methods of practice have changed considerably. We do not notice these from year to year, but only in retrospect.

For example, witness the history of milk fever. Before udder inflation was discovered almost by accident, perhaps 98% of the cases died. With inflation nearly 95% were saved. First of all, it was potassium iodide solution; then oxygen, and finally just common air, such as is used by Fourth of July orators and candidates for public office. Then came the administration of strychnine, then atropine, then lobeline and, finally, sterile ethereal camphorated oil. These saved a few of the more complicated cases. Finally, a new era opened up with the introduction of calcium gluconate and dextrose. Many cases of eclampsia, obscure ailments of the grass tetany type, and the acetonemia group were miraculously cured. I remember breathing a sigh of relief when wax dilators were first suggested to hold the air in the udder. This prevented much trouble from teat strictures and mastitis when bandages and tape had to be wound around the teat. But it is much better not to inflate the udder at all.

As I look back over my career as a practitioner in one location for 33 years, I think milk fever cases have been my best "builder-upper." As one good client expressed it:

"Doc, every time I sit down to milk that cow I think of you. I never figgered she hadda chance."

And so, as I have repeated so often, we are judged by the final results of the case whether we are at fault or not.

New Drugs Prove Useful

In the field of infection the sulfa drugs show great promise, but they must be used with caution. New vermifuges, vitamins, biologics and other essentials are enlarging the scope of therapeutics for all species of animals.

Only in digestive disorders, particularly in the horse, have we made slow progress and, in my sad experience, no specific has yet been found for various types of equine impactions. Of course, lentin, Lang's solution, Reeks' capsules, gastric lavage and various laxatives have helped, but the death rate is still high. Much of this may be due to the delay in our being called. I have suggested to more than one client that he send to Montgomery Ward for an entirely new set of intestines. On the whole, bovine therapy has moved along with the other lines of successful treatment so that ailments of cattle do not give us the trouble they once did.

Instead of getting all "messed up" with several gallons of aqueous solution to be administered to an atonic rumen, I merely give

The "Autobiography of a Veterinary Practitioner," which has appeared in these pages for the past three years, is concluded with this installment. There have been many requests that the series be republished as a book. However, the limited supply of paper, at present, renders this inadvisable.

The book would comprise approximately 250 pages and could be supplied at about $2.00 per copy. If those desiring copies will so indicate now, publication of the book will be given consideration when the paper supply is again normal.

lentin and gluconate as in milk fever. A ruminatoric capsule and perhaps several Reeks' capsules are given orally and a laxative powder left for the owner to give in any way he can. We often suggest an electuary, but that is up to him.

Biologics, also, have given wonderful results in such stubborn ailments as infectious dysentery, lung fever and in the prevention of many more serious maladies, notably, sleeping sickness in horses.

Forty years ago a farmer's income for an entire years' labor could be wiped out in a few days by the appearance of hog cholera. When anti-hog cholera serum was first introduced in 1908 I was a junior at Ohio State and we did not then appreciate its value or its possibilities. Due to many "breaks" on account of not using enough serum, the pathway of many practitioners was a rocky one, as they can well remember to this day. It took a few years to convince the average swine raiser that vaccination was really a safeguard and would prevent the disease when properly performed.

Speaking of penicillin I remember, when a small child, of running into the house with a badly cut foot. My Scotch-Irish grandmother first stopped the bleeding with cotton, then she picked out the oldest, moldiest pieces of bread in the "crock" and made a bread-and-milk poultice. This she carefully bound over the lesion, as she told me it would be all right in a few days.

Liquidating Tuberculosis

To lapse into personal memories again, my mother died when I was eight years of age. I can still remember the beautiful October day when I was led into her bedroom. She had been taught never to cry, and with a wan smile she said goodbye. She never touched me, for she believed her trouble was "catching." An hour later she was dead. The cause, I was told afterwards, was "consumption."

It will be seen I had a special interest in the disease, and fate cast me among some of the worst tuberculous cattle herds in the northwest. While I always felt sorry to have to condemn a number of cows out of a dairy or range herd, it made me feel that I was doing my small share in eradicating the disease.

In 1910, of 3000 cattle that I tested in one district, over 800 reacted and were slaughtered. Contrast this with our latest county area test in 1942, when only two reactors were found in the more than 3,000 animals tested. This shows the extent to which our profession has brought bovine tuberculosis under control.

The same story may be told of glanders and dourine. In 1910 I mallein tested around 300 horses for a construction outfit and had to shoot over 60 reactors. I have not seen a case of glanders for over 15 years.

Decline of Equine Practice

About 1912, autos and trucks began to appear. They were crude at first, but they moved and that was what the public wanted. During World War I, or from 1914 to 1918, motor-powered vehicles increased with astonishing rapidity and a new era began in agriculture. As stated before in these articles, I saw the change from total horse power on the farm to almost total mechanized power in less than two decades. Perhaps our next era will be in the air where some think a lot of our economic policies are at the present time.

Rise of Small Animal Work

After World War I, or about 1920, elaborate small animal hospitals were built and the business boomed. Animal pets seemed to take a new place in our way of life and were given more scientific attention. The raising of fur-bearing animals developed from a fad to a large and stable industry and the prevention and treatment of their diseases occupy many of our profession. Poultry has assumed great importance.

Changes Due to World War I

It is almost impossible for us who went through the stirring days of 1914-18 to describe the changes that took place during and immediately after that great conflict. What seemed essential in 1910 was forgotten by 1920, and something approaching a revolution in habits, customs and thinking occurred. And such changes occur every few years.

Perhaps it is these periodic innovations in national and global affairs that shape the destiny of all mankind. War stimulates the progress of everything of military usefulness and now many of these, such as the radio, the airplane and "movies" are transformed into everyday necessities. What the next 10 or 15 years will bring only the rash will venture to predict.

Importance of a Location

With over 2200 veterinarians in our armed services and with about 600 new graduates each year, when peace comes, there will be a great demand for locations for practice. Nothing our national association can do, it seems to me, would be of as much value to the profession as to make a survey of all desirable locations and to have them properly described. Think of the time, expense and trouble the seeker after a new location could be saved if he were able to see at a glance the exact situation at a certain place. It would prevent

having too many competent practitioners going to one location, while none went to another equally desirable place. In the first instance cutthroat competition would result while in the latter, the stock owners would be compelled to do their own "doctoring" or trust to the local "handyman." Nothing breeds quackery, confusion and a lack of public confidence in our profession as much as these two unfortunate situations, both of which result in poor veterinary service.

A good location is paramount in even moderate success and a little missionary work carried on all the time helps immensely. By this I mean work with your client. Put yourself in his place. Treat him fair and square. Nowadays, I am not censured when I lose a case. The neighbors think of the many I have saved, and take an occasional loss as a matter of course. But it was not always so. It required time to convince them that I did the best I could for all cases and that in the long run it paid to call me.

Moderation in living means good health and happiness, as a rule. For years, if I was out late last night, I "hit the hay" early tonight. When I hear of someone who has died from overwork, I wonder if too much liquor, too much food, too much poker and too much "hellin' " around was not the real cause.

In order to be at one's best and have a pleasant disposition, one must be healthy. To be otherwise, is merely to drive business away. The public does not care a whoop how bad you feel. When I am occasionally sick, as with a little touch of flu or a bad cold, my clients think it a good joke. I have always been so healthy they do not even sympathize with me when I am ill.

Practice is such an individualistic line of work that it would be difficult for me to work in harmony with another person, as independent as I am. There are partnerships that succeed, but they are the exception and not the rule. For these reasons I think a partnership is not the best tie-up in the world for the average veterinarian, although indisputably it has advantages in some cases.

A Third of a Century

It has been said the first hundred years are the hardest. If this is true on the basis of the past 35 years I should negotiate the next 65 years without too much difficulty; then I am told the worst is past. Perhaps a brief recapitulation of my 35 years since graduation may not be out of place. I am sure many of my readers about my own age can go along with me down the passing years.

1909-1913. When I was graduated in June, 1909, my intellectual powers had reached a pinnacle, and they have been steadily declining ever since. The first small puncture of one's inflated egoism occurs when one takes the first state board examination. The next deflation takes place when one is called out to see a valuable horse with apparently "a little touch of kidney trouble," as the owner explains it. Quite a number of neighbors have gathered in to see the "young doc" perform, and the latter tries to remember all the things he has "larnt" in college. He attempts to take the pulse, but the patient rudely swings its head around in a corner and scrapes all the splinters off a rough board in our expert's wrist. When he tries to auscultate the flank for peristaltic sounds, the owner warns him "the hoss is a leetle touchy." He finds the owner is a truthful man when his head is rammed into a corner, and three of the onlookers jump in and pry the victim out. The most approved treatments are administered but the patient grows better no faster.

"Better draw his water, young feller," suggests Grandpappy, who admits he has cured thousands of "sick hosses" without a single loss. Our hero hesitates, as the patient thrashes around, using both hindlegs at once. Then a relenting Providence saves our expert's hide by causing the animal to urinate a small amount. The tension has ceased. Grandpappy nods his head approvingly. To make a long story much shorter, our patient begins to bloat; then he breaks out into a cold sweat; his eyes grow glassy, and he begins to reel around. As the hired man sadly seeks a soft place in the back forty to dig a large hole, our young practitioner has learned his first lesson. If he is friendly and sociable, the older men will feel sorry for him, and try to boost for him. If he is "uppity" and acts smart, he will soon be moving to another location. Mother Experience is a good teacher, but she uses no gloves in her course of instruction. Good advice is:

> Be patient if your job is small
> And your rewards are few
> Remember that the mighty oak
> Was once a nut like you.

1914-1918. Although the World War I began in August, 1914, and our country did not get into the fracas until April 6, 1917, the whole period was one of great livestock prosperity, with land values going to ridiculous figures.

1919-1923. Post-war readjustments saw a great deflation in values and prosperity. A farmer who was worth $50,000 in 1919 found himself twenty degrees below zero in 1921. Long-haired reformers and dreamers said "Another war like this is impossible." We sank our Navy and set the dogs on our Army.

1924-1929. A period of prosperity, with money plentiful and chances of investments never better. It was a sucker's holiday.

1930-1934. The well known and sadly remembered "depression," which is the modern term for an old fashioned panic. A 1928 millionaire felt so low in 1930 he could wear a high hat and walk under a snake without knocking it off. When a client would tender us a five dollar bill our hands trembled like a pointer pup with chorea.

1935-1939. Slow recovery from the depression and we entered the slot machine age. Storm clouds rising over Europe presaged bad weather ahead, but our nation basked in the fool's paradise of "it can't happen to us." We even sent more metal scrap and missionaries to the Japs. We thought that Hitler was a long, long distance away.

1940-1944. These years are too vivid to recount, especially since Pearl Harbor, December 7, 1941. Thus we have covered the 35 years of our experience in practice.

The Future

The future of our profession looks bright to me. Our status in the professional world has been raised greatly by outstanding research, investigation and disease control. With a new world coming into being after this conflict; with animal diseases being carried from one country to another by airplane; with the livestock depleted in many parts of our war-torn globe and with increased demands for general veterinary services, veterinarians should prosper in the coming years.

Of course, as usual, thousands will graduate and hundreds will succeed. A few will rise to the heights. Years will come in rapid succession, and the young man or woman at noontide today will be in the twilight tomorrow. It would be interesting for me to come back from heaven and spend a few days on earth a hundred years from now.

The Fade-Out

I have often speculated on what disease or accident will take me out of this interesting world. I am not afraid of any cerebral disturbance, for my brain is just as good as new, having never been used much. Perhaps, a client will step in some day and pay an old, old bill, and the shock will be too much for my delicate constitution.

This subject reminds me of the time one of our old pioneers, George Pickett, was in the hospital, and an Elks' sick committee, composed of Brothers Jim Caine and Claus Peterson visited him.

"And how is George today?" inquired Jim.

"Oh, he's convalescing now," returned a new nurse.

The Brother Elks hesitated and held a whispered consultation. Then Jim spoke:

"All right, Miss, we'll just wait out here till he gits through."

However, death is painless, and one sinks into eternal slumber like a tired child going to sleep. Yes, life is a passing parade, and we are here for such a little while we should try to enjoy its brief moment with the philosophy of

"It, too, shall pass away."

(The End)

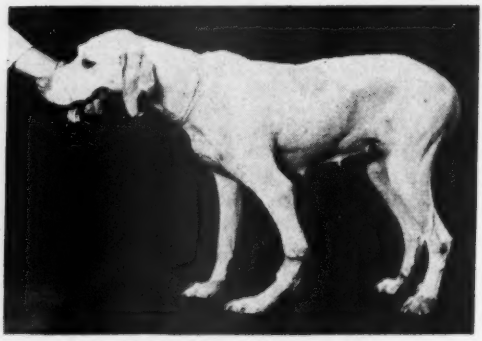
Clinical Reports

Pseudarthrosis in a Dog

A three-year-old, pointer bitch was presented for examination and treatment November 22, 1943.

Five weeks previously the dog had been hit by a mowing machine which almost completely severed the left front leg at the distal ⅓ of the radius and ulna. The foot hung only by skin and the flexor tendons on the posterior portion of the leg. The fracture was neglected and no permanent splint was applied until the skin wound had completely healed. The leg was then placed in a plaster cast for two weeks. When the cast was removed the bones had not healed but a "false joint" had formed.

There was marked enlargement at the point



Although an enlargement was present, the dog walked normally

of the break and the foot could be freely rotated as if a true ball and socket joint were present. However, the dog had no control over the movement of the joint. She could walk and showed no evidence of pain when full weight was placed on the limb. She did not favor the limb, but the foot flopped awkwardly as the leg was brought forward in walking. When standing the leg bowed backward and outward.

On fluoroscopic examination, it was found that no calcification had taken place but a large callus infiltrated with fibrous connective tissue enclosed the broken ends of the bones and held them together. This formed a flexible hinge between the bones and accounted for its movability.

An operation was advised and performed as follows:

The operative area was cleaned, shaved, and properly disinfected. Local anesthesia of 2% procaine solution was used by infiltrating the tissue. Strict aseptic technic was employed throughout the operation. A liberal longitudinal incision was made over the joint on the antero-lateral surface of the leg. The ends of the bones were isolated by blunt dissection and the excess fibrous tissue and callus was cut away after separating the tendons carefully, and making sure no major blood vessels or nerves would be cut. The ends of the bone were scraped with the scalpel and a fresh healing surface was left. The bones were set carefully and yucca board splints applied. Every other day the splints were removed and the skin wound treated. At the end of one week a plaster cast was applied and left in place for three weeks.

When the cast was removed the bones had healed but a marked enlargement was still present at the point of the injury. The dog could walk normally.

R. M. GRANDFIELD

Manhattan, Kansas

Death in a Colt from a Fall

April 30, 1944, a bay standard-bred yearling colt was presented for treatment with the history that it had been found unable to rise after falling over a 15-foot cliff.

There was complete paralysis of the posterior part of the body but the colt had entire control of the front half of its body. When offered food the animal ate readily.

The colt was placed in slings one hour the first day and an hour longer each succeeding day. Supportive treatment consisted of 250cc of calcium gluconate the first day and 500cc dextrose daily. The evening of May 2 the colt appeared alert and ate two pounds of a mixture of equal parts of bran, oats, and corn chop.

The colt was found dead the next morning Post-mortem examination revealed: Edema of the pectoral region extending up over the shoulder to the withers and down the back. All the muscles of the body appeared blanched and anemic; especially those of the loin and rump. Fracture of the seventh, eighth, and ninth ribs at about the middle of the thoracic wall with formation of a heavy callus, and a localized area of pleuritis and adhesion of the lungs to the pleura at the site of the fracture. Other than stasis of the large intestines, rectum and bladder, the abdominal viscera appeared normal. A large hemotoma lay between the peritoneum and a fracture of the ilio-sacral juncture. The left wing of the ilium and left lateral process of the seventh lumbar vertebra were broken into several pieces. The sacro-iliac, ilio-lumbar, and ligaments of the lumbar vertebræ were torn loose from their attachments as were the tendons of attachment of the gluteal, biceps femoris, semimembranosus, semitendinosus, psoas, illiacus

and quadratus lumborum muscles. Examination of the spinal canal revealed a severing of the spinal cord at the lumbo-sacral juncture and a watery-like softening of the cord extending from the mid-lumbar region to the caudal end.

ROBERT C. REED

Stockton, Kans.

Bilateral Episiotomy in the Cow

On the afternoon of March 21, 1944, a small 16-month-old, Hereford heifer was presented for treatment with a history of having been in labor for approximately 20 hours.

A vaginal examination revealed a large fetus in anterior presentation, in the dorso-sacral position. The right forelimb was retained in the uterus.

The fetus was repelled. The flexed limb was extended and the forelegs were brought out through the birth canal. Obstetrical chains were then attached to the forelimbs and traction was applied. Further mutation was required to bring the head into proper position. Another chain was looped around the neck of the fetus and, with slow steady traction on the chains, the forelegs were brought through the vulva. The large head of the fetus entered the anterior portion of the vagina but the posterior part of the vagina was not sufficiently dilated to allow passage of the head.

Manual efforts to dilate the vulva and the use of additional traction on the fetus were unsuccessful in attempts to dislodge the calf.

A lateral incision was made through the right lateral wall of the vagina, extending laterally approximately three inches and about 2½ inches in depth, through the mucosa, submucosa and muscular layers of the vagina. A similar incision was made through the left wall. This allowed the vulva to be dilated sufficiently to permit easy extraction of the calf, after which the incisions were sprinkled lightly with sulfanilamide powder and closed with five interrupted sutures. The placenta was so firmly attached that it was not removed at the time.

Daily treatment consisted of washing the area with clean water and applying sulfanilamide powder to the wounds. The placenta was removed manually two days after the operation. The following day the stitches were removed. Healing occurred rapidly in the operative area, however, a slight pyometra continued until the cow was released from the hospital 10 days later. The cow then continued to improve until, apparently, she was completely recovered.

An operation similar to this is common in human obstetrics and, according to the results obtained here, it may be indicated in veterinary obstetrical work more often than it has been used heretofore. Advantages of episiotomy in the cow are:

1. It speeds the delivery of the calf and thus increases the chance for a live calf.
2. It brings relief to the cow from straining and it facilitates labor.
3. It prevents uncontrolled tearing of the perineum.
4. There is a definite saving of time and labor to the veterinarian.

CHARLES B. SCHWAB

Morrowville, Kans.

Cow Impaled on an Angle Iron Fence Post

I was called late one evening (July 27th) by a man who said he had a cow with a stake in her a couple of inches. Visualizing a wound of the axilla or groin I told him to leave the animal alone and not attempt to remove the stake and that I would come immediately.

Arriving at the farm I found the animal, a small grade holstein, on a grass plot about 400 yards from the house. The family and many neighbors were congregated about her. Following the telephone call, a general agreement had been reached that the cow should be killed and, on arrival, I was requested to carry out the verdict. It was easy to persuade the owner that he didn't need a veterinarian to kill his cow and since I was there, we had better, at least, make an attempt to save her.

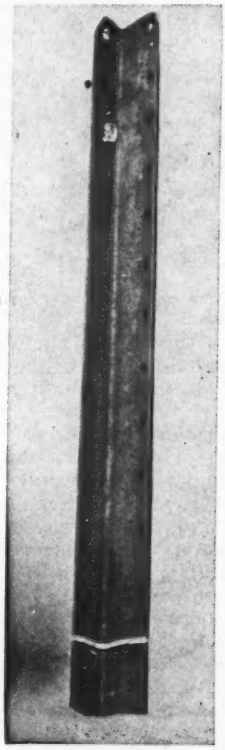


Fig. 1. This angle iron stake was imbedded in the abdomen from the top to the white line—a distance of 25½ inches

The cow had been "staked out" on this grass plot during the day, tethered with a chain about 30 feet long to an angle iron fence post driven into the ground. When the owner went to bring the cow in for the night, he found her standing over the stake which extended up into the abdomen and try as he would, he was unable to get her off it. She had turned and twisted about until a

jagged star-shaped wound had been torn in the skin and abdominal wall fully six inches in its greatest diameter. A loop of intestine as large as a man's head hung out through the opening. The owner couldn't remember how far the stake extended above the ground and I couldn't determine how far it entered the abdomen. The cow's back was humped up and she wasn't standing fairly on the front feet but up on her toes. I assumed this position was due to an effort of the animal to hold herself up off the stake.

Even with the help of the owner and three or four of the neighbors, I was unable to release the cow. So a hack saw was obtained and with much effort and by the light of such flashlight and lanterns as the neighborhood could supply, the angle iron was sawed through about two inches below the belly. Immediately the end of the iron dropped down several inches, the hump went out of the animal's back and she stood squarely

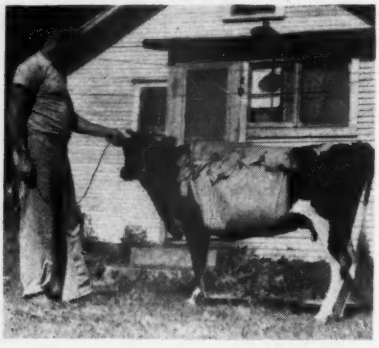


Fig. 2. The cow on the day the abdominal bandage was removed

upon her front feet. Even then I didn't suspect the real cause for the unnatural position she had assumed when standing over the stake.

A large canvas was wrapped around the animal's body to protect the viscera that had escaped through the wound and she was led to a nearby, old, unused barn that was hastily wired for electricity. Here with comparatively good light, well rotted manure for an operating table and walls and ceiling, festooned with cobwebs she was cast and an examination made. The stake was withdrawn easily and I was astonished to find it had penetrated the abdomen clear to the muscles of the back and had actually been pushing up the back before it was cut. More surprising still, with the exception of a tear two inches long in the abomasum and a similar rent in the gall bladder, no injury to the abdominal viscera could be detected. From appearance, not more than a quart of blood had been lost. The animal was in good condition. It would take a better knowledge of anatomy than I possess to enable one to drive a bludgeon of this size two feet into a cow without doing 10 times the damage that I found in this one.

The small tears in the stomach and bile cyst were sutured easily as the ragged tear in the abdominal wall allowed plenty of room to work with both hands inside the cavity. The viscera were replaced and a wick for drainage put in for about eighteen inches—as far as I could follow the track of the invading body.

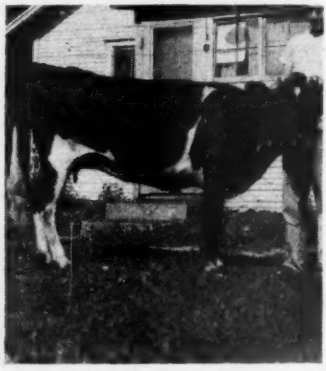


Fig. 3. The cow two weeks after the injury

The wick, the wound and all surrounding parts were smeared with a paste made of water and ground up tablets of sulfamerazine, the only sulfa drug I had with me. The wound in the skin and abdomen wall was difficult to suture because of several jagged triangular flaps that didn't fit together any too well.

An abdominal bandage was put on and left undisturbed for six days (Fig. 2). The cow ate 24 hours later and when the bandage was removed on the sixth day, was producing as much milk as before the injury—two gallons daily. The drain also was removed on the sixth day and showed no evidence of pus anywhere. The cow appeared as well as if nothing had happened and the wound in the skin and belly wall was healing rapidly. As this is written a month later, the animal shows no evidence of her experience except a small scar at the site of the skin wound.

Nothing is known as to how the injury occurred. The owner speculates that the cow may have been attacked by a dog and reared up to get away; coming down with nearly her whole weight on top of the stake, subsequent struggling caused the jagged tears. The stake was bent somewhat, near the ground, showing that she must have struck it with great force. In fact but for this bend, the cow would not have been able to reach the ground with her front feet.

J. W. PATTON

East Lansing, Mich.

Hydrometra in a Toggenburg Doe*

History

The subject was a registered Toggenburg doe about seven years old, a heavy producer, who kidded normally in March, 1943. Milking was discontinued on this doe in December, 1943 in preparation for her kidding in February, 1944. Some time after she was bred her abdomen was noticeably enlarged and the owner thought she was going to have twins. After becoming quite distended the swelling suddenly disappeared, but following this the swelling reappeared. This took place twice before the doe was received at the Veterinary Department for diagnosis, at which time she was noticeably enlarged. The enlargement was particularly noticeable in the flank region on both sides.

Procedure

It was decided to perform an exploratory laparotomy to determine the cause of the enlargement. Chloral hydrate was given intravenously very slowly in the correct dosage; however, after the injection was completed, and immediately after the incision was made in the abdominal wall, the goat died from respiratory failure. After the death of the goat the incision was enlarged, and the uterus was removed through the opening, as shown in Fig. 1. The thin walled uterus contained 14 liters of a clear yellowish fluid.

Fig. 1. The posterior part of a Toggenburg doe with the uterus removed through an incision in the left flank. (1) the ovaries. (2) right horn of uterus. (3) left horn of uterus

That the pressure exerted by the 14 liters of fluid, plus the effect of the chloral hydrate, caused respiratory failure is a possible explanation of the goat's death. It is just as well that the goat died from the anesthetic, since she was no longer of any value.

A. J. DURANT
O. S. CRISLER

Columbia, Mo.

*University of Missouri, College of Agricultural, Journal Series No. 962.

Outbreak of Pneumonia in Calves

In midwinter an outbreak of pneumonia occurred in 19 Guernsey calves, which were kept in a combination maternity and calf barn that was damp and cold. The calves were confined in three different pens according to age as follows: five calves under six weeks, eight calves two to five months and six calves six months of age or older. The only ill calves were the eight in the two to five months age group. Three calves had died in the preceding week or ten days.

The temperatures of the sick calves ranged between 104 and 106° F. with the exception of one, the temperature of which was 103.3° F. Diarrhea and also a pronounced inspiratory dyspnea accompanied by occasional coughing was present in all except the calf with the temperature of 103.3° F. This animal showed no respiratory distress but did reveal an increased vesicular murmur on auscultation. The other calves on auscultation revealed moist and sibilant rales throughout both lungs. In addition one calf had extensive subcutaneous emphysema around the throat, shoulders and sides.

All 19 calves were given 100cc each of citrated dam's blood intramuscularly and on the following day the temperatures had dropped approximately 1° F. in the affected animals.

The administration of sulfapyridine to seven of the sick calves was then begun. The dosage was 6gm per day per 100 pounds of body weight divided into three doses.

The temperature of the 8th calf had dropped from 103.3 to 102° F. and the animal was given no further treatment.

Within five days all calves had returned to normal with the exception of the calf showing subcutaneous emphysema which died, suddenly, three days after medication was started.

A post-mortem examination of this calf revealed congestion of the anterior lobes of the lungs and an extensive interstitial emphysema.

W. B. BOUCHER

Philadelphia, Pa.

Book Reviews

Laboratory Methods of the United States Army. Edited by *James Stevens Simmons*, B.S., M.D., Ph.D., D.P.H., Sc.D. Brigadier General U. S. Army; Chief of the Preventive Medicine Service, Office of the Surgeon General; Lecturer, Department of Preventive Medicine, John Hopkins University Medical School; Lecturer in Public Health, Yale University, School of Medicine; Professorial Lecturer in Preventive Medicine, George Washington University Medical School, etc., and *Cleon J. Gentzkow*, M.D., Ph.D., Colonel, Medical Corps, U. S. Army, Commanding Officer Deshon General Hospital, formerly Chief of the Division of Chemistry and Physics, The Army Medical School. Fifth edition; fabricoid, semi-flexible binding; 111 illustrations (including 8 color plates); 823 pages. Approved by the Surgeon General, U. S. Army. Published by Lea & Febiger, Philadelphia, 1944. Price $7.50.

The present edition of Laboratory Methods of the U. S. Army, like the first edition, was prepared to meet a wartime need for a manual describing practical methods for use in the medical and sanitary laboratories of the Army. The first edition was written during World War I in the Office of the Surgeon General. Three editions followed, each larger than the preceding. The present war necessitated an enormous expansion of the Army's laboratory service and created an unusual need for reference works dealing with laboratory technic.

The work is more comprehensive than the title indicates since, in addition to laboratory methods, general discussions are given of nearly all subjects. For example, urine analysis is accompanied by a discussion of kidney function; the section on examination of gastric and duodenal fluid includes a general discussion of the secretion and functions of each; the discussion of bacteriological examinations is amplified by a general discussion of each of the pathogenic types of organisms, etc.

The work comprises 11 parts or divisions, viz.: clinical pathology, chemistry, mycology, bacteriology, rickettsiae and filterable viruses, protozoology, helminthology, entomology, pathology, special veterinary laboratory methods and statistical methods. The same subjects are discussed in more than one division of the work, e.g., the physical characteristics, specific gravity, acidity, total solids, fat, ash nitrogen, casein, albumen, lactose, added water, preservatives, etc., of milk and other dairy products are discussed under chemistry and the bacteriological examination in the bacteriology division.

Part X, Special Veterinary Laboratory Methods by Col. Raymond Randall, V.C., is limited to laboratory methods for the detection or identification of diseases of animals. The discussion of most diseases of animals, which are communicable to man, occurs in other portions of the book. Colonel Randall is author also of the section which discusses the laboratory examination of milk and other dairy products, meat and meat products.

There are several world maps included in the illustrations depicting the distribution of various diseases to which members of the armed forces may be exposed. Disease organisms, including stained specimens of the various stages of protozoa and a long list of vectors are depicted in nearly a hundred illustrations.

The work can be unqualifiedly recommended as a laboratory guide. It will prove useful to veterinarians who do some laboratory work in connection with their practices. Although it pertains principally to the diseases, parasitisms and poisonings of man, because of the information it gives of what can and cannot be accomplished by laboratory examinations, it will interest those who depend upon commercial laboratories for all laboratory assistance.

Laffy of the Navy Salvage Divers. By *Iris Vinton* with drawings by *Addison Burbank*. 159 pages; illustrated in colors. Published by Dodd, Mead & Company, New York, 1944. Price $2.25.

The story of Laffy is the story of a real dog in real adventures with an outstanding group of men.

Laffy, named for the USS Lafayette (the rechistened Normandie), is the mascot of the Navy Training School (Salvage) located on Pier 88, North River, New York City. This is the only school of its kind in the world—the only school where divers are trained to bring up ships from the bottom of the sea, to clear harbors, to salvage wrecks of ships, docks or sea gear.

Laffy is a lively fox terrior that strayed on to the Pier and stayed to become the beloved companion of the salvage divers. He knows every nook and cranny of the Pier, from the Patch Room to the Diving Tank. Whenever he likes, he goes over to the Diving Float, where he watches the sailors and officers of the Navy learning to dive and work on salvage problems. He was in on the beginning of the raising of the Normandie and was there at the Pier to see her towed away to drydock. Laffy provides plenty of interest and unpredictable humor to the salvage divers on the Pier.

Incidentally, or possibly that may have been the main objective, much interesting information about the Navy Training School (Salvage), the work of the salvage divers and of the sailors themselves is given.